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A STUDY OF PREHISTORIC ANTHROPOLOGY.—HAND-BOOK FOR BEGINNERS.

BY

THOMAS WILSON,
Curator of the Department of Prehistoric Anthropology.

From the Report of the National Museum, 1887–'88, pages 597–671, and Plates LXXXVII–CVI.

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A STUDY OF PREHISTORIC ANTHROPOLOGY.*

HAND-BOOK FOR BEGINNERS.

By THOMAS WILSON.

Prehistoric anthropology is susceptible of many divisions, each of which is sufficiently extensive to form an independent branch of science, such as the following:

Biology and comparative anatomy.
  Human anatomy.
    Anthropometry, craniometry.
Comparative psychology.
  Literature, language (written, oral, sign).
Industry.
  Materials and implements of every craft.
  Clothing and personal adornment.
  Habitations, and household utensils.
  Weapons.
  Objects for amusement.
  Articles, uses unkown.
Architecture. Fine arts.
  Monuments and public works.
    Roads, trails, canals, irrigating, etc.
    Mounds—sepulchral, effigy, altar.
    Forts and earth-works.
    Graves and cemeteries.
    Idols and temples.
Architecture. Fine arts—Continued.
  Cliff or cave dwellings.
  Towers, ruined or otherwise.
  Engraving.
  Painting.
  Sculpture.
  Ceramics.
  Decoration.
  Ornamentation.
Sociology.
  Love and marriage, child-life.
    Social organizations, customs and beliefs, pastimes.
  Tribal organization.
  Government, property, law, etc.
  Religion, myths, creeds and cults. Folk-lore.
  Education, relief and charities.
  Mortuary customs and furniture.

Short experience in the field will demonstrate the necessity of a knowledge of science, or of certain branches, of even wider scope than those enumerated. Remains of human industry may be found which, insignificant in themselves, derive their value from their geologic horizon. Of this kind may be mentioned the Trenton implements found by Dr. Abbott in the gravel deposits of the Delaware River; the same of the quartz implements found by Miss Babbitt in the terraces of the Mississippi River, at Little Falls, Minn.; the discovery of the remains of a prehistoric fire-place, decided by Professor Gilbert to belong to the

* The imperfections of this fragmentary paper are known to no one better than to the author. It contains nothing new or original, not even the illustrations. No general work on this subject applicable to the United States is easily attainable. Many requests have been received by the author for elementary information. It was found impossible to give satisfactory answers by letter, and this paper has therefore been written as an answer to serve temporary purposes until a more complete work shall have been prepared.—T. W.

quaternary deposits between Lakes Erie and Ontario; and of an obsidian spearhead in the white marl of the Walker River Cañon formed by the fossil Lake Lahontan in northwest Nevada, discovered by Professor McGee; and the paleolithic implements found by Dr. Hilborn T. Cresson, at Claymont, Delaware, and at Upland, Pa.

So also animal remains are frequently found associated with human remains, and therefore some knowledge of zoology is required. The stone implements themselves belonging to the prehistoric peoples require a knowledge of geology and mineralogy to determine their names and the locality from which they come, both of which items may be of great importance.

THE DISCOVERY OF PREHISTORIC MAN.

Denmark is entitled to the credit of the discovery of the existence of man on earth in the ages before history began. The historic period proper of Scandinavia began about 1000 A. D. But for centuries before that time there had been made, frequently on stone monuments, but also in other ways, runic inscriptions and the poetic legends of the early times of that country, called Sagas. The antiquarians of that country in the past century delighted in studying these Sagas. In this pursuit they discovered Kjokenmoddings, the Danish name for kitchen refuse, the dolmens, the polished stone hatchets, the beautiful flint poignards, and the daggers, knives, spear, and arrow-heads, for which that country has been so justly celebrated. They became impressed with the idea that these belonged to a more ancient race of people than that which had written the Sagas and had erected the runic stones. They were able, by their examination and study, to separate the implements found into three grand divisions, which they designated, respectively, the ages of stone, of bronze, and, lastly, of iron. These ages were found to have endured in these countries for a long period of time and came to a high perfection. Thomson published his memoir in 1836, announcing these discoveries. The conclusions were that the Kjokenmoddings were places of habitation of prehistoric man, or, at least, places occupied by him, and that the shells which formed the heaps were but the refuse from his kitchen. The pieces of flint and bone were his implements, the dolmens were his tombs, and the polished and beautifully-worked flints were but his tools and weapons. They placed his earliest occupation of these countries at from three to four thousand years B. C. and continued it down through the epochs of the different ages until that period when the written history of their country began.

The age of stone, when applied to the Scandinavian countries, refers only to polished stone, for no traces of man's existence in those countries during the paleolithic period have been found. Public attention became attracted to the subject of prehistoric man by Dr. Ferd. Keller in 1853, when he discovered in Lake Zurich the remains of the Swiss Lake dwellers of prehistoric times. He found the same ages of stone,

bronze, and iron as have been found in Scandinavia. Other men took up the investigation, and finally the opening of the canal between Lakes Bienne, Neuchatel, and Morat not only brought to light the great deposit of the iron age at La Tene, but so lowered the waters in the two former lakes as to expose their shores, and to turn loose upon them an army of seekers after the implements of prehistoric man.

In 1859 was developed and acknowledged as genuine the discovery of the paleolithic period, an earlier epoch in the existence of prehistoric man. This was called at first the age of chipped stone, because the implements were chipped or flaked, and not polished. This discovery was made by M. Boucher de Perthes in the valley of the river Somme, France. Thus there were found two kinds of stone implements—the chipped and the polished—and from their respective positions it was concluded that they belonged to two different races of men occupying the country at different and perhaps remote periods of time, in which the earlier chipped the stone to make his implements, while the other had so increased his knowledge as to be able to polish them. These different periods were named by Sir John Lubbock paleolithic, meaning ancient stone; and neolithic, recent stone. From that moment prehistoric anthropology received an impetus proportionate to its importance, and since then has gradually elevated its rank among the sciences.

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Monsieur de Mortillet published "Le Préhistorique," which, with its album of illustrations, has become a standard work for the age of stone in France. He now has in press a work to be called "The Protohistorique or the Aurora of History."

MM. de Quatrefages and Hamy have now under way a work to be entitled "Histoire Générale des Races Humaines," to be published by the ethnologic library, but of which there has, as yet, been issued only the introduction by M. de Quatrefages; and "The Aztecs," by M. Lucien Biart.

Dr. D. G. Brinton, professor of ethnology and archæology in the Academy of Natural Sciences of Philadelphia, has edited the portions of the "Iconographic Encyclopedia" which relate to anthropology, ethnology, and ethnography. The articles on the two former subjects were prepared by Dr. Brinton, and the latter was translated from the German of Georg K. C. Gerland.

"The Prehistoric Times," by Sir John Lubbock, is the most complete work yet published in English.

It would be useless to attempt the mention of every book extant, dealing with the subject of Prehistoric Anthropology. I give only the most prominent works which should be found in almost every public library. From these a choice can be obtained, and with these the student may obtain a fair start in the science.

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The prehistoric ages have been divided in other parts of the world into stone, bronze, and iron, so called from the material principally employed for cutting implements.

THE STONE AGE.

The stone age has been divided, in Europe, into periods, although scientists are not entirely harmonious therein. The names given, are: Eolithic, or dawn of the stone age; the Paleolithic, or ancient stone; and the Neolithic, or recent stone. The first two are of chipped stone, the last is of polished stone. The first or Eolithic period belongs entirely to the tertiary geologic epoch, and is not accepted by many of the scientists of Europe. I give it a place here because of the possibility of information we may obtain concerning it in America from disputants and investigators. By being thus forewarned they might find implements or evidence in this country which would materially assist in solving the riddle and establish the existence of this period.

THE EOLITHIC PERIOD.

But little is known concerning this age in any part of the world. But enough has been discovered to justify attention to and a search for its evidences in places where they are likely to occur. The implements will be of the rudest possible form, so much so that their human manufacture has been the subject of much discussion, doubt, and, many times, denial. The materials of which the implements found have been made are usually flint or chert, but there is no reason why the man of that period, if he had an existence, may not have used any stone which was capable of being chipped.

It is possible that bone or shell may have been used for implements, and fossil specimens may be found bearing evidence of human workmanship. While no such instance has been recognized, yet the objects are worthy of attention. Fossilized human remains might also be found. Some examples are declared to have been discovered in Europe and in South America, not to mention the contention over the Calaveras skull.

The man of this age is claimed to have had an existence during the tertiary geologic period. On this question the world needs enlightenment. This can only be obtained by intelligent observation, accompanied by accuracy of statement, with minute details, as everything depends, in case of the discovery of a piece of evidence, upon the location, situation, and association of the object, which once disturbed from its original position can not be replaced. It is always best to call whatever of scientific aid is obtainable before any removal is made; also as many witnesses as practicable.

The value of human implements or remains will be greatly enhanced if they are found associated with the remains of fossils, especially animals belonging to that period. These should be gathered and reported with all possible detail and the specimens preserved, no matter in what number. In all discoveries of this kind the contention has heretofore been whether the stratum in which the object is found belongs really to the tertiary or to some later geologic formation, and after that whether there has been any subsequent disturbance or intrusion.

By all means do not seek to clean the specimens by scraping or washing, nor even by brushing. The archæologic value of the Calaveras skull was destroyed by this means.

These objects may be sought for in the clays and gravels of the Washington Columbia formation, in the phosphate beds of South Carolina, the coral beds in the lagoons of Florida, and the *equus* beds of Texas and Mexico. It is the contention of some geologists, though disputed by others, that the auriferous gravels of California also belong to the tertiary formation.

THE PALEOLITHIC PERIOD.

The paleolithic period of the stone age has been subdivided into various epochs, though in these subdivisions and their nomenclature the scientists of Europe are by no means agreed. M. Lartet named the epochs after the animals which have been found associated with the implements and called them, respectively, the epochs of the cave bear, the mammoth, and the reindeer. Monsieur Dupont, of Belgium, divided it only into two and named the epochs after the mammoth and the reindeer. M. de Mortillet has divided it into four epochs and has named them, respectively, the Chellian, after the station of Chelles, a few miles east of Paris; the Moustierian, after the cavern of Moustier on the river Vézère, Dordogne; the Solutian, after the cavern of Solutré near Macon; and the Madelenian, after the cavern or rock shelter of La Madeleine, Dordogne.

In later days the tendency seems to be to divide them otherwise. M. Cartailhac, M. Reinach, following Mr. John Evans, are in favor of the first period being called that of the alluvium and the second that of the caverns. All these gentlemen are, however, unanimous in their agreement that this period and all these epochs, whatever they are to be called, belong to the quartenary geologic period; that they were earlier than the present geologic period, and that they came to an end before its commencement. The most certain, and therefore to me the most satisfactory division, has been that of M. de Mortillet, named after the various localities where the respective implements have been found in their greatest purity. I give my preference to it, but do so subject to the correction incident to further discovery. If for no other reason it is more convenient. The names given are for localities and, consequently, are purely arbitrary. They may not, perhaps, serve for general terms over the world, but within their own locality they have a definite and certain meaning, while to say the epoch of alluvium, the epoch of caverns, the epoch of the drift, or the epoch of the mammoth, bear, reindeer, etc., might have an application in other countries which would deceive the student or reader. The names of Chellian, Moustierian, etc., have no such application, are not possible to be applied to other countries. They mean, then, just one kind of civilization, one kind of implement, and thus we know what is meant when

these terms are used. If other countries have different things to be described, if different epochs are found, then other names may have to be given, but when we speak now of these epochs, the Chellian, Mousterian, etc., and the implements that belong to them, the speaker and hearer are on a common ground in which both understand the same terms used to mean the same thing.

The world is indebted principally to M. Boucher de Perthes for the great discovery of prehistoric man in the paleolethic period. He lived at Abbeville, on the river Somme, about half way between Paris and Calais. In 1841 he found in a sand-bank, then being worked at Menchecourt, a piece of flint rudely fashioned to an edge and point, which excited his attention and wonder, for he asked himself, "How could this stone have taken this form by any other than human intervention?" He continued his investigations at occasional intervals, chiefly in the excavations and fillings at Abbeville and in the gravel which was being removed he found many of the same implements. In the year 1846 was published his first work on the subject, in which he announced his belief that these were human implements and of the same age as the gravels in which they were found. This statement made but few converts; nevertheless, being an enthusiast, and pressing his belief always in season and sometimes, possibly, out of season, came to be regarded as what would now be called a "crank."

Doctor Rigollot, in 1853, was the first to make such examinations of the locality by which, finding the implements *in situ*, he became a believer in the new theory. M. Boucher de Perthes was no exception to the rule that prophets are without honor in their own country. At last, however, the tide turned in his favor, and I can not do better than to quote from Sir John Lubbock, himself one of the actors, his description of the event:

In 1859 Dr. Falconer, passing through Abbeville, examined the collection of M. de Perthes, and on his return to England called the attention of Mr. Prestwich, Mr. Evans, and other English geologists to the importance of his discoveries. In consequence the valley of the Somme was visited in 1859 and 1860, firstly by Messrs. Prestwich and Evans, and shortly afterwards by Sir C. Lyell, Sir R. Murchison, Messrs. Busk, Flower, Mylne, Goodwin-Austen, and Galton; Professors Henslow, Ramsay, Rogers; Messrs. H. Christy, Rupert Jones, James Wyatt, myself, and other geologists.

Mr. John Evans, in his "Ancient Stone Implements of Great Britain," describes the same event:

We examined the local collections of flint implements and the bed in which they were said to have been found, and, in addition to being perfectly satisfied with the evidence adduced as to the nature of the discoveries, we had the crowning satisfaction of seeing one of the worked flints still *in situ* in its undisturbed matrix of gravel, at a depth of 17 feet from the original surface.

The locality was also visited by the French savants who were especially qualified for such a scientific investigation. MM. Mortillet, d'Acy, Gaudry, de Quatrefages, Lartet, Collomb, Hebert, de Verneuil, and G.

Pouchet. Dr. Gosse, of Geneva, was also an earnest and ardent investigator. Mr. John Evans says:

> Indeed it turned out, on examination, that more than one such discovery had already been recorded, and that flint implements of similar types to those of Abbeville and Amiens had been found in the gravels of London at the close of the seventeenth century, and in the brick earth of Hoxne, in Suffolk, at the close of the eighteenth, and were still preserved in the British Museum and in that of the Society of Antiquaries.

The name "paleolithic" was given to this period by Sir John Lubbock. It is composed of two Greek words signifying ancient stone. Belonging to the stone age, all its cutting implements were, of course, of stone. The method of manufacture was by chipping, and all cutting edges or points were thus made. The man of this period seems not to have known, at least never employed, the method of smoothing or sharpening a stone by rubbing it against or upon another. Bone and horn implements were also made during this period, and in its latter part were apparently greater in numbers than the stone.

This period belongs entirely to the quaternary (pleistocene) geologic period, and is assumed to have been contemporaneous, in Europe at least, with the formation of the river valleys and the deposit of the gravels therein. The climate of the first epoch is supposed to have been warm and moist; that it afterwards grew cold, and man in Western Europe sought the caves for protection. It is believed by many this period of cold corresponds with the glacial epoch of that country.

The fauna of the first epoch was composed principally of animals which were extinct before our earliest knowledge of natural history. The *Elephas antiquus*, a pachyderm, the ancestor of the elephant tribe; *Rhinoceros Merckii*, *Trogontherium*, a large beaver, have been found at Chelles, associated with implements of human industry.

These animals are now all fossil. They belong to the quaternary geologic period, and have never been seen or known in the present day. They have been found in many other prehistoric stations associated with the Chellian implements of human manufacture. Here was the beginning of human art. This was the first art product.

The foregoing sentence might be easily overlooked. Its importance is largely out of proportion with the space which it occupies, for it tells the story that man existed in that country contemporaneous with these animals, and in a geologic period so much older than the present that one can scarcely imagine man's antiquity as having any relation thereto. The succeeding epochs were more like that of the present. The mammoth came first, and after it the reindeer. One can obtain a faint idea of the time by considering that the reindeer which occupied Southern France in probably greater numbers than it now does in Lapland, was the animal on which the prehistoric man of this epoch in that country relied principally for his food. A study of the fauna of that period in southern France, as compared with that of the present, shows that there were eighteen species of animals, then

occupying that country, which in the present time have immigrated to the colder regions. Thirteen of them have gone to the north, by degrees of latitude, while five, like the chamois, mountain goat, etc., have retreated to the mountains in search of that cold which was necessary to support their lives, and which they did not find in the subsequent warm climate of southern France.

THE CHELLIAN EPOCH.

The Chellian implements here figured are the standard ones for this period, though they were mostly almond-shaped or oval, with the cutting edge to the point, which is the contrary to those of the neolithic period. The body of the implement was thick, after the shape of an almond or peach stone. It was not thin and flat like those of the later epoch, the Solutrian, and the two are not to be confounded. They are made of flint where that stone was obtainable; where it was not, quartz and quartzite seems to have been employed, although any stone would serve which was homogeneous, so that it might be flaked in every direction; tough, that it might hold an edge, and hard, that it would not break or crumble. The flint always broke under a blow with a conchoidal fracture, and this may be frequently seen.

These implements differ somewhat in form and size, though they are substantially the same. Some of them are more round; others more pointed. A few approach the disk form, and have an edge which might have served for scraping rather than cutting; but all we know of this is obtained from an examination of the object itself. They were all made by chipping, and were usually brought to an edge by the removal of smaller and finer flakes. Chips, flakes, spawls, etc., the débris of manufacture, are frequently found in the deposits associated with finished implements. Many, indeed most of the specimens, show signs of use. Some are broken and others apparently unfinished.

Occasionally the cutting edge extends nearly around the implement, but many times a portion of the pebble is left for a grip. So, while it is possible it may have been attached to a handle in some cases, it is evident that sometimes it was intended to be taken in the hand. The hand may have been protected against the sharp ones by a bit of skin, fur, grass, or other substance. I much doubt whether any of them were attached to a handle, for it must have been with great care and labor that the workman was able to bring them to this sharp edge all around, and when so done it produced a form of implement very difficult to successfully insert in a handle. To make a firm attachment the handle must envelop it at its greatest diameter, and herein lies the difficulty. If the sharpened implement be only partially inserted, a few hard blows would split the handle; if it be inserted too far the same blow will drive it through. Plate LXXXVII, Figs. 1–2.

The flint of which these implements are made has, in many specimens, passed, since their manufacture, through certain chemical and

1 ½

2 ½

PALEOLITHIC IMPLEMENTS.

FIG. 1. Chellian implement (flint); from St. Acheul, France.
FIG. 2. Chellian implement (quartzite); from India.

physical changes on their surface. Some show a brilliancy called patine; in some the color has changed to red and yellow, and so on through the scale to chalky white. This change is produced by contact with the atmosphere or earth, or by the contact of water which has percolated through the various earths in the neighborhood, generally those containing iron, and has changed the chemical combination of the flint on its surface. This change sometimes extends deep into the stone, and in small specimens may pass entirely through it. In the United States all this might be called weathering; in France it is called patine. The objection to the former word is that it conveys, possibly involuntarily, some relation to the weather, while the patine may be formed on a specimen deep in the earth.

Dendrites are also formed on the specimens. These changes are all evidences of antiquity of the specimen, and to the experienced eye become testimonials of its genuineness.

The use of the Chellian implement is unknown. The wise men of Europe have made many guesses and suppositions, but these are at best nothing more than speculation. Many of them bear undoubted traces of use on their edges. Mr. John Evans in his latest work reverts to his first and original opinion, "That it is nearly useless to speculate as to the purposes to which they were applied." Sir John Lubbock says, "Almost as well might we ask to what would they not be applied. Infinite as are our instruments, who would attempt even at present to say what was the use of a knife? But the primitive savage had no such choice of tools. We see before us, perhaps, the whole contents of his workshop, and with these weapons, rude as they seem to us, he may have cut down trees, scooped them out into canoes, grubbed up roots, kill animals and enemies, cut up his food, made holes in winter through the ice, prepared firewood," etc.*

The implements of the Chellian epoch are found substantially all over the world. This would indicate, if it does not prove, the expansion of that civilization, and the duration of that epoch to have been much greater than has ever heretofore been supposed. Those from Great Britain are found only in the eastern and southern portion, from Norfolk around to Devonshire and Land's End. They have been found in every quarter of France and southern Belgium, Italy in all its parts, also in Spain and Portugal. They have not been found in northern England, Scotland, Wales, or northern Ireland. Neither in northern Belgium, or Holland, or in the Scandinavian countries, or that portion of Germany bordering on the Baltic, or in northern Russia. These countries were probably covered at that epoch with glaciers, or possibly by the Great North Sea. Paleolithic implements have been found in Asia, Palestine, in India from Bombay to Calcutta, in Cambodia, Japan, in Africa all along the shores of the Mediterranean, and up the valley of the Nile, and lately in the United States.

* Prehistoric Times, p. 364.

They have been called in England drift implements, because they have been found in the river drifts or deposits. Their position when thus found indicates the same antiquity as the river valleys themselves. There was a time when the rivers filled the valleys from hill to hill, pouring down with a rush and carrying the greatest quantity of water to the sea. In that time the irresistible current eroded the earth, and, if need be, the rock, to make for itself a waterway. As time progressed the water subsided more or less, and the current become slower and less powerful. The sand and gravel which had before been carried out to the sea began to be deposited here and there in this bend and on that point, until the deposit came to the surface of the water and formed what is now the highest terrace. Then the river was narrowed and the terrace became a new river bank. This process was repeated again and again until the river finally retreated to its present bed, and left terraces, sometimes three in number, the first being higher, deeper, and more distant from the river than the others. These are now the marks of the successive stages in the formation of the river valleys.

The sand and gravel deposit of the river at Chelles spreads out and forms the plain of the river valley. It is from 22 to 26 feet in thickness. The sand and gravel rests upon the original chalk, and is about on a level with the highest floods of the river in modern times. These deposits are of different degrees of fineness, and are laid in strata or layers, showing that they were made by the action of water. The strata are not always continuous, and differ in thickness and position, showing that the water had varying currents. There are to be found occasional huge blocks of erratic stone. The sand and gravel is sometimes intercalated by other strata which could not have been laid down at the same time or in corresponding manner. One of these is a stratum of calcareous cement several inches in thickness. In many other places, but nearer the top, are pockets or strata which contain various solutions of iron, the percolating water from which gives the color to the implement heretofore described.

There have been many and great discussions over the formation of these river valleys and the deposits of their sand and gravel. These as to the time, manner of formation, and antiquity. I do not enter into this discussion now. I merely state a fact on which all disputants are agreed: that the implements of human industry belonging to this epoch are found in these river gravels, in positions which indicate their deposit at the time of the original formation and at a distance from the river and depth below the surface which indicates their antiquity to be equal with the first deposit. Whether they were swept down from the springs which formed the headwaters of the river, were dropped on the borders in the near neighborhood, or precisely in what manner they became involved with the sand and gravel in which they are now found, is not only unknown but there has as yet been developed no satisfactory theory.

In seeking to establish the existence of a paleolithic period in America, it has been objected that many of the implements introduced as evidence were found on the surface. In western Europe surface finds are not at all uncommon. The St. Germain Museum, at Paris, exhibits six cases of Chellian implements. In five of them are displayed those from the river gravels, and in one is shown similar implements from the surface. These are distinguished as being from the plateau. (The plateau in this case meaning the surface of high level unaffected by the wash of the water which formed the river.) Mr. Solomon Reinach, curator of that museum, in his catalogue and "*Description Raisonnée*," says, page 84:

> The implements found in the ancient alluvium of the rivers are those which have been used or have been rejected. Sometimes they are water-worn, sometimes altogether new and even unfinished. * * * The implements gathered on the plateau come from the camps or workshops. They are much less interesting than those of the alluvium, not being accompanied by a fauna which can serve for their chronologic classification. * * * As the soil of the plateaus is continually upturned by its cultivation, which has thrown together in the same layers the remains of successive civilizations, so the paleolithic and neolithic instruments are often found on or near the surface mixed with those of the epoch of metal and of modern times.

The plateaux on the surface of which these Chellian implements were found extends largely over the interior of France.

Dr. John Evans, the celebrated prehistoric archæologist of England, and the author of "Ancient Stone Implements of Great Britain," says in that work (page 531), "Not far from Currie Farm I found *on the surface of the ground*, in 1869, a well-marked paleolithic implement, in character and size resembling that of Stud-Hill (Fig. 462), and stained a rich ochreous color." During a visit to Dr. Evans's collection in 1889 the writer saw thirty or more paleolithic implements which had been found *on the surface* in the neighborhood of Ightham, Kent. Mr. B. Harrison has gathered in the same neighborhood nigh six hundred paleolithic implements which are described by Mr. Prestwich in the Quarterly Geologic Journal, No. 178, of May 1, 1889. I quite agree with Mr. Reinach that these surface implements are much less interesting than those found in the river gravels. I agree and have always said that the implements thus found are not proof of the *antiquity* of the paleolithic period. The most I have ever contended was that they were evidence of its *existence*. The paleolithic implements of Europe have been found by the ten thousand in the river gravels at various depths, and associated with the extinct fauna of the Quaternary geologic period. Thus the antiquity of the paleolithic period has been established without the aid of the implements found upon the surface. In the United States this is not the case; therefore the discovery of the paleolithic implements on the surface have a greater relative importance than in Europe. They, however, are evidence only of the existence and not of its antiquity of a paleolithic period. The antiquity remains to be solved by other means.

Enough has been said to demonstrate that the paleolithic implements of this epoch belong to one general type. Their similarity of material, mode of manufacture, and general appearance all testify thereto. While there is this similarity they are not copied one from another. Each one has an individuality, yet they can be recognized as belonging to a common family and having a common origin. In this manner, and for these reasons, a person acquainted with them, or who has had sufficient experience, will be able to recognize a Chellian implement independent of its locality or its associations. This knowledge comes only from experience, but it is the same experience by which the American archæologist recognizes the genuineness of the arrow or spear head, the polished stone hatchet, Indian pipe, and similar objects, and is fairly able to assign them to their proper localities.

The following paragraphs, relating to the differences in form between paleolithic and neolithic implements, may be found of interest:

A glance at the stone implements hitherto discovered in the river drift, whether of England or France, will at once show how different in character they are, as a whole, from those of the neolithic period, excepting, of course, mere flakes, and implements made from them, and simple blocks and hammer-stones. So far as we at present know, not a single implement from the river drift has been sharpened by grinding or polishing, though, of course, it would be unsafe to affirm that such a process was unknown at the time when they were in use. With the unpolished implements of the neolithic period, which most nearly approach those of the paleolithic in form, it will, as a rule, be found that the former are intended for cutting at the broader end, and the latter at the narrow or more pointed end. Even in the nature of the chipping a practiced observer will, in most instances, discern a difference.

When first treating of the character of these instruments (in the Archæologia, now thirteen years ago), I pointed out these differences between the implements of the two periods as being marked and distinct; and though since that time, from our knowledge of the form and character of the stone implements of both periods having been much enlarged, some few exceptions may be made to a too sweeping assertion of the distinctions between the two classes, yet, on the whole, I think they have been fully sustained.

Unground flint implements, with a sharp point and a thick truncated butt, and, in fact, what I have termed tongue-shaped in form, are, for instance, no longer confined to the drift, but have been found by myself, with polished implements, on the shores of Lough Neagh, in Ireland; and yet, though analogous in form, they differ in the character of the workmanship, and in their proportions from those from the gravel. The difference is such that, though possibly a single specimen might pass muster as of paleolithic form, yet a group of three or four would at once strike an experienced eye as presenting other characteristics.

In the same manner some of the roughly chipped specimens from Cissbury and elsewhere—such, for instance, as Fig. 23*—appear to be of the tongue-shaped type, or like other river-drift forms. These are, however, exceptional in character, and as their finding appears to be confined to the sites of manufactories of flint implements, where a very large proportion of the specimens found are merely "wasters" produced in the manufacture, it is doubtful how they are to be regarded as finished tools.

On this subject of the difference in character between the paleolithic and neolithic forms I have been severely taken to task by M. Zinck, in the Proceedings of the Society of Northern Antiquaries of Copenhagen, who has figured several Danish neolithic specimens in juxtaposition with some of my own figures of implements from the drift. In many cases, however, the comparison is made between implements of very

* Ancient Stone Implements, p. 74.

different dimensions, though, by being drawn to different scales, they are made to appear of the same size in the figures; and, in other cases, the specimens engraved are apparently unfinished, or merely wasters thrown away.

But, even granting that these exceptional instances of resemblance can be found, there is no one who can deny that the general *facies* of a collection of implements from the river drift, and one from the surface, is totally and entirely distinct. With regard to the Danish stone antiquities, I think I may safely say that I have as extensive a collection of them as any one out of that country; and, further, that I have more than once examined the collections, both public and private, at Copenhagen, as well as at Stockholm and Lund, and yet that I do not remember to have seen any specimen—unless possibly a mere flake or rough block—which, if placed before me without comment, I should have taken to be paleolithic.

In most cases, even if a similarity of form should be found to exist, there will be a difference in the character of the surface of the material; the deep staining more especially, and the glossy surface so common on the implements from the gravel, being but rarely met with on those from the surface soil.

But, though, on the whole, so widely differing from the implements of the neolithic period, those belonging to paleolithic times show a marvelous correspondence with each other in whatever part of England they are found; and this correspondence extends, in an equal degree, to the implements found in the river gravels of France. In illustration of this, Mr. Flower has engraved, side by side, two implements from Thetford and two from St. Acheul, each pair being almost identical both in shape and size. But what is more remarkable still, this resemblance in form prevails not only with the implements from the river gravels of western Europe, but with those from the laterite beds of southern India. It is true that the material is somewhat different, the Indian implements being formed of compact quartzite instead of flint, and that this circumstance somewhat affects the character of the fracture and facets, but, so far as general form is concerned, they may be said to be identical with those from the European river-drifts.*

MOUSTIERIAN EPOCH.

This is the commencement of the cavern period. During this epoch and the two succeeding, man inhabited principally the caverns and rock shelters. While I would not assert that the implements and objects belonging to these epochs are not to be found on the surface and otherwheres, yet it is true that the habitations, the workshops, the residences, the fireplaces, hearths, etc., of these three epochs, are to be found principally in the caverns or under the rock shelter. When Monsieur Reinach speaks of the epoch of alluvium, he means the epoch prior to this; when he speaks of the period of the caverns, he means these three epochs following. It is entirely possible that these may have been contemporaneous, that man may have occupied them all at once, to have made and used the implements belonging to these epochs all at one time, and such has been the contention of some eminent scientists. But they are not by any means agreed upon that theory or statement. These subdivisions of the cavern period, made by M. de Mortillet, are Moustierian, the Solutrian, and the Madelenian.

The Moustierian is so named after the Cavern de Moustier, on the river Vézère, Dordogne, France. The typical implements are the

* Evans: Ancient Stone Implements of Great Britain, p. 568.

point and scraper.* The point is different from all other points, in that while one side is left flat and smooth as it was struck from its nucleus, the retouching by which the point and edge are made is all done from the opposite side. The scraper is made in the same way, and its peculiarity is that its edge is upon the side rather than upon the end, as it was in all succeeding epochs. These appear to have been the first scrapers used by the pre-historic man. While the Moustierian implements have been found in the river gravels of Europe, there has been much contention as to their contemporaneity with those of the preceding epoch. But they have been found in the caverns at such depths and with such associations as to cause many pre-historic anthropologists in Europe to believe that they formed a separate epoch, during which the caverns were occupied by the inhabitants for a long period of time. It has been contended that this epoch was, at least in southern France, contemporary with the glacial period. This, if established, would sufficiently account for his occupation of caves and rock shelters. The extinct fauna of the preceding epoch is not found in connection with these implements. The animals become more like those of our own time. This epoch begins what has been called the cavern period.

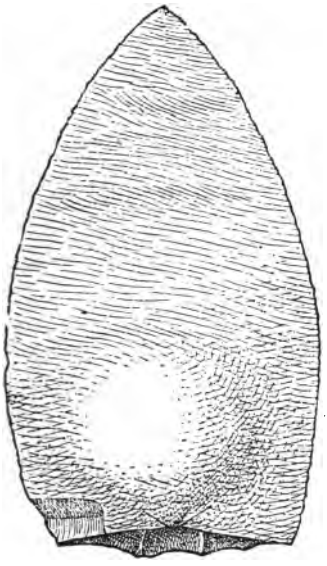
SOLUTRIAN EPOCH.

Is so named after the Cavern of Solutré, near Macon, Sâone et Loire. The Chellian implement had in this epoch ceased to be made; also the one-sided Moustierian point. They were probably replaced by the large and thin spear-head which is shaped like a laurel leaf. The scrapers have been changed in form. They are smaller, and the scraping edge is on the end instead of being upon the side. Knives and saws of flint also appear. The man of this epoch excelled in the art of chipping flint. Indeed, it is doubtful if any subsequent age or epoch even equalled him. The implements are renowed for beauty of form and fineness of finish. It is by this progress that this epoch has become recognized. It is remarkable that these leaf-shaped implements should be found in France in nests or *en cache*, and that great numbers of similar instruments should be found in the United States likewise frequently in nests. It would be exceedingly strange if, upon further study and careful investigation, it should be discovered that the American implements should belong to the same paleolithic epoch, as do those of France.†

Points were also made of bone, sometimes apparently for use in piercing skins, or for sewing garments. Sometimes to replace the chipped flint for spear-points. Another implement peculiar to this epoch was a fine flint-point, apparently a spear, with a tang and shoulder on only one side.

But it is in its art products that this period is remarkable. The Chellian implements and the Moustierian points and scrapers are scarcely fine enough to be worthy of the title of artistic.

* Plate LXXXVIII. † Plate LXXXIV, Figs. 1, 2, 3, 4.



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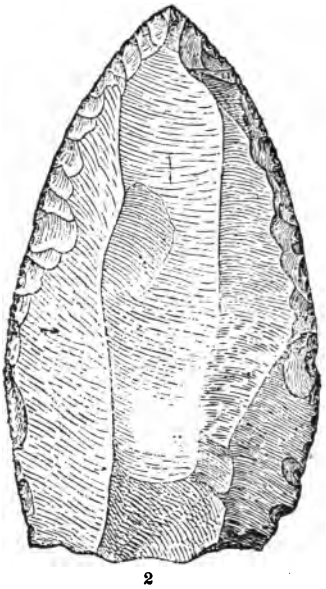

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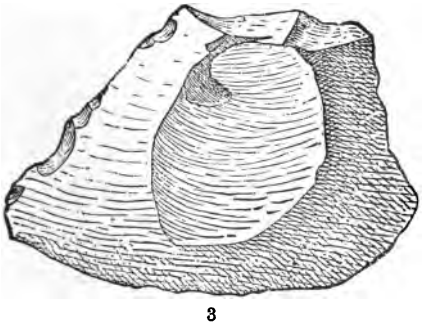

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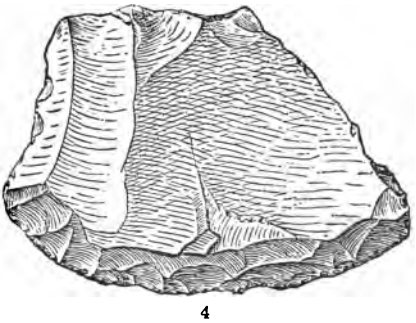
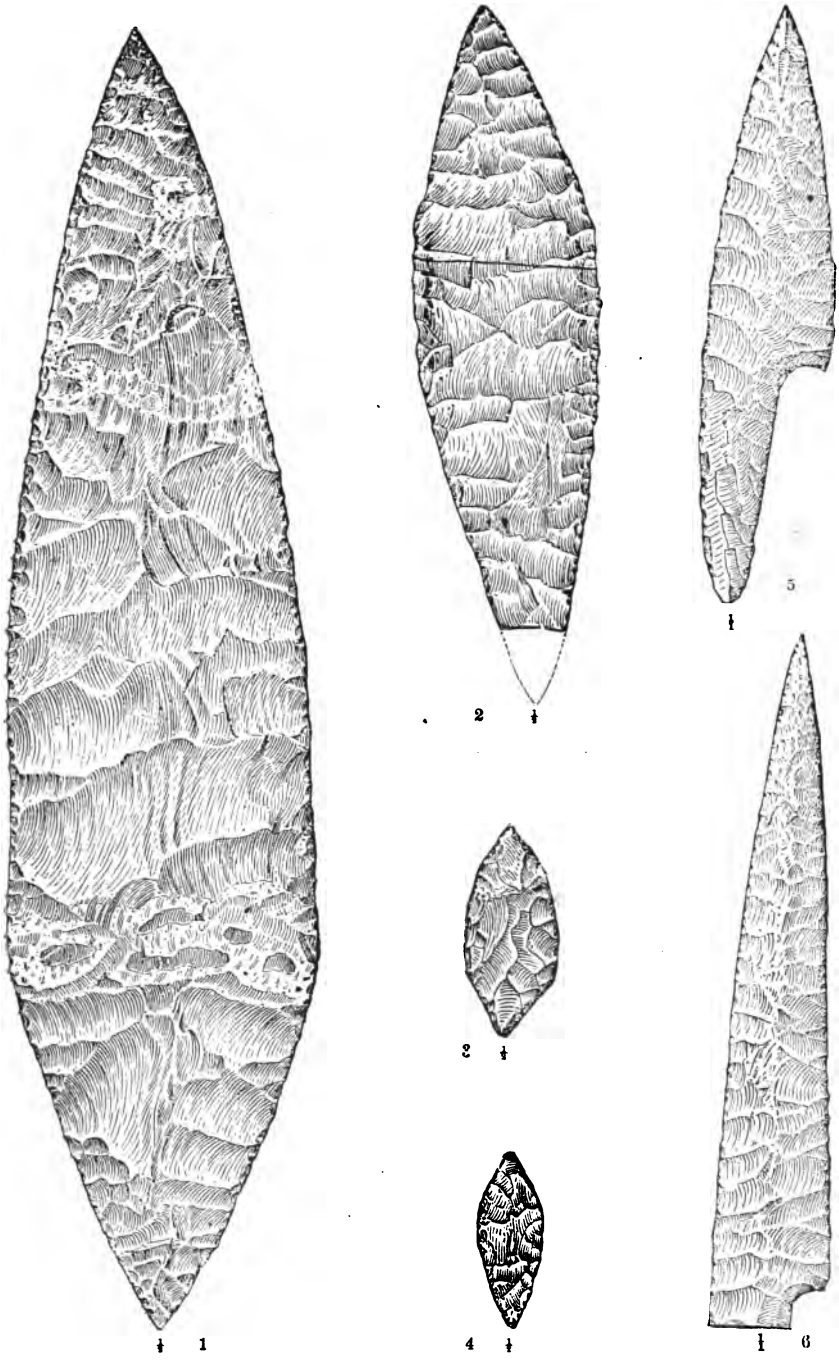


4

PALEOLITHIC IMPLEMENTS.

FIG. 1. Moustierian point, spear or otherwise (flint); from cavern of Le Moustier.
FIG. 2. Opposite side of Fig. 1.
FIG. 3. Moustierian scraper. showing bulb of percussion (flint); from Chez Pourè.
FIG. 4. Opposite side of Fig. 3.



PALEOLITHIC IMPLEMENTS.

FIG. 1. Solutrian point; shape of laurel leaf. Rigny-sur-Arroux (Saone-et-Loire), France.

FIG. 2. Solutrian point. Grotte de l'Eglise, Dordo ne.

FIG. 3. Solutrian point. Grotte de Gargas, Vaucluse.

FIG. 4. Solutrian point. Grotte de l'Eglise, Dordogne.

FIGS. 5 and 6. Solutrian implements, beautifully chipped for spear or other points, with a shoulder on one side. They may have been used for fish spears or harpoons (flint); from Dordogne.

The art of the third period, the Solutrian, was much finer, although confined to the chipping of flint and the making of bone and horn implements. The representative implement of this epoch is the flint spear-head or dagger, which was shaped like the laurel leaf. It was in the working of the flint to make these objects that the best art of the Solutrian epoch is manifested. It may be objected that there was no art required in chipping flint implements, but an inspection of those from the Solutrian epoch, coupled with an attempt on the part of the objector to make one of the larger and finer, will show how far he is from the truth.

An examination and measurement of these implements is required to understand the delicacy of their manufacture. It must have required much education and experience and a large amount of manual dexterity.

Figure 1 represents one of these leaf-shaped points found *en cache* with ten others. It is one of the largest known, and is in the Museum of Chalon-sur-Saone. Its length is 14 inches, its breadth 3¼, and its greatest thickness less than three-eighths of an inch. It is made entirely by chipping, which is not either primary or secondary, but appears to be even tertiary. The flakes by which it has been reduced have been struck or pressed off from the edge, and are so long and thin as to resemble shavings rather than chips.

The art of chipping flint attained its highest point during this epoch. It has never been exceeded, and rarely equalled in any time and by any people. The pre-historic people of Scandinavia, in Europe, and those of Mexico and California, in America, are the only ones which have in any way approached it. The modern Indian has chipped his arrow-heads, and many persons of high artistic abilities have, in the interest of science, reproduced them, making them sometimes of flint, obsidian, and even of common bottle-glass. Occasional persons have used their abilities, like "Flint Jack," in making spurious implements to be palmed off as genuine ones. But no flint-knapper of the present day, whether amateur or professional, has yet been able to reproduce one of the fine, Solutrian, leaf-shaped implements. We have had to contend many times with other fraudulent and spurious specimens which evinced a high degree of art and manual dexterity, but never with forgeries or counterfeits of these beautiful implements.

MADELENIAN EPOCH.

So named from the rock shelter, La Madelaine, on the Vézère, Dordogne, about half way between Le Moustier and Les Eyzies.

This epoch endured longer than the preceding. Its stations are more frequent; the area more extended; its implements increase in number, variety, and form, and indicate continued progress. While in former epochs the material used by man for the fabrication of his utensils and implements was almost entirely of flint, or at least stone, in

this epoch he used bone, horn, and ivory. He made the long straight flakes of flint in profusion, for his need for knives and saws was naturally great.* Scrapers, gravers, etc., were also of flint (Figs. 1, 3, 4); but piercers or points, needles, harpoons, hooks, and ornaments of divers sorts, were made of bone, horn, or ivory.†

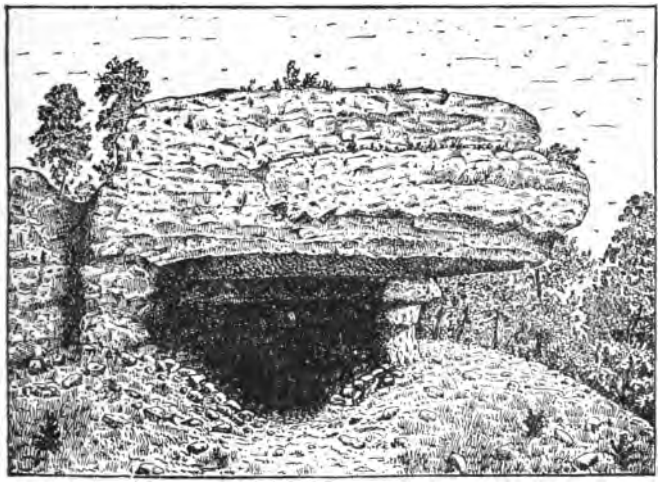
It was in the Madelenian epoch that pre-historic art attained its perfection. The art of that epoch seems to have been indigenous to that country in which its greatest manifestations have been discovered; that is, the Dordogne district of France. It does not seem to have been an imitation, nor to have been borrowed from any other country or people, but only to have been a display of the artistic tendencies of the human mind, and a manifestation of the manual dexterity of that period and locality. It consisted sometimes of sculpture done in the round, sometimes of engravings or etchings on stone, bone, or horn, possibly on wood (though such specimens have decayed), and also the making of the bone and horn implements such as points, harpoons, daggers, needles, etc. The decoration was sometimes of geometric designs made by curved or straight lines, by festoons, zigzag, or herring-bone, or by the same figures made by dots or points.

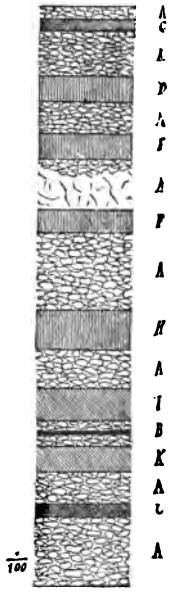
The principal and wonderful manufacture of art in this epoch was the representation of living things. Sometimes the animals represented are at rest, but many times they are in action. Hunting scenes are depicted in which the hunter, a man, is shown in the chase and engaged in active conflict with his game. In one, a man is throwing a spear; in another, the serpent bites his heel;‡ deer in action; the reindeer with his nose high in the air and horns thrown on his back. A reindeer browsing, which represents a veritable landscape with perspective drawing. The engraving and sculpture represent the mammoth, the reindeer, horse, bison, birds, fish, serpent, musk-ox, and others.§ Some of these are Arctic animals now found only in cold countries. Some of these are of animals now extinct. A mammoth is found engraved on a piece of ivory (part of his own tusk), a cave-bear was engraved on a flat stone of schist, a poignard was made of reindeer horn, the handle of which is in the form of a reindeer himself. These all came from southern France, and are evidence of their existence in that locality, for the artist must have seen them before he could depict them.

The art tools with which this work was done have been found in considerable numbers. They are of flint, and have been chipped to the same sharp, triangular point as the steel graver of modern times.‖

The implements and utensils of every-day use were objects of an art by no means contemptible, even as compared with those of our times. The harpoons, needles, daggers, and other implements and utensils were so ornamented as to show an appreciation of decorative art applied to household or domestic uses which would not be unworthy the decorative schools of art of the nineteenth century.

* Plate XCI, Fig. 2.
† Plate XCII.
‡ Plate XCIII, Fig. 2.
§ Plates XCIII and XCIV.
‖ Plate XC, Fig. 2, and Plate XCI, Figs. 3, 4.





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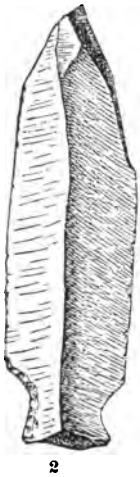

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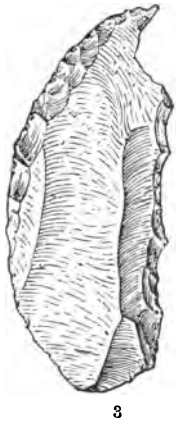

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PALEOLITHIC IMPLEMENTS.

FIG. 1. Grotte du Placard. Charente, France.
FIG. 2. Flint graver. Gorge-d'Enfer, Dordogne, France.
FIG. 3. Flint flake; worked. Les Eyzies, Dordogne, France.
FIGS. 4 and 5. Flint points; worked to an edge. La Madeleine, Dordogne, France.

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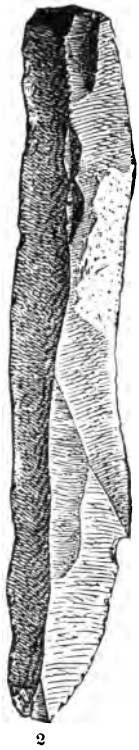

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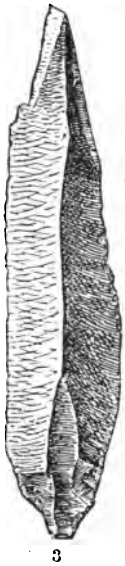

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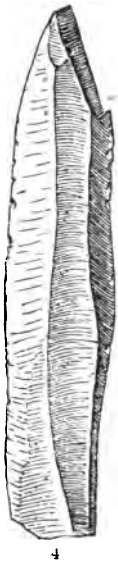

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PALEOLITHIC IMPLEMENTS.

FIG. 1. Flint scraper, with rounded end. La Madeleine, Dordogne, France.
FIG. 2. Flint flake; probably a saw or knife. La Madeleine, Dordogne, France.
FIGS. 3 and 4. Flint gravers. La Madeleine, Dordogne, France.

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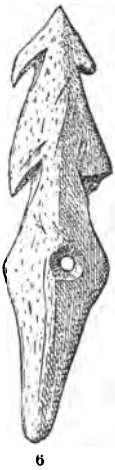

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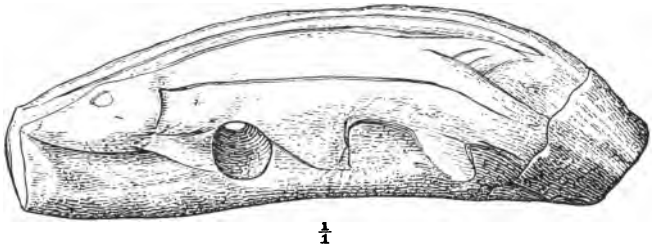
PALEOLITHIC IMPLEMENTS.

FIGS. 1, 2, 3, and 4. Harpoons made of reindeer horn. La Madeleine, Dordogne, France.

FIGS. 5, 6, and 7. Points and harpoons made of reindeer horn; hole and slit for attachment to shaft. Southern France.



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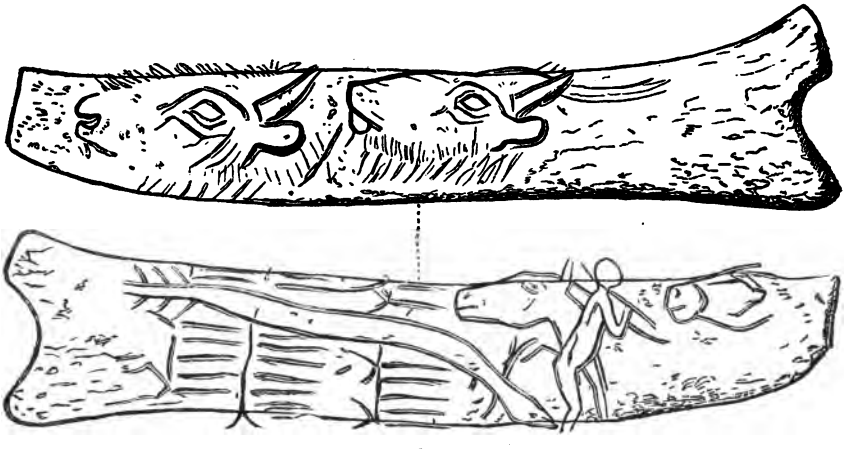

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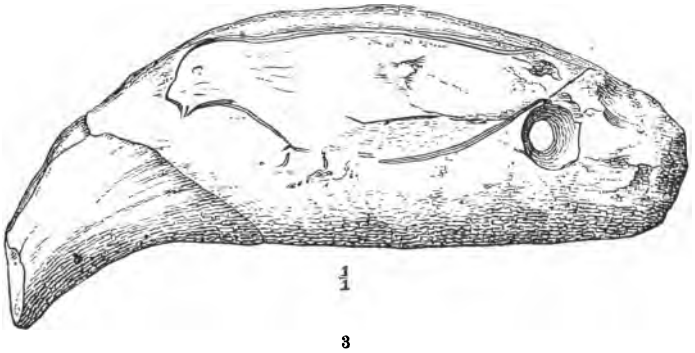

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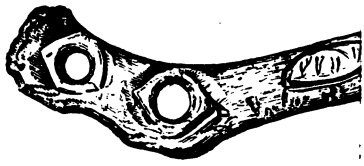
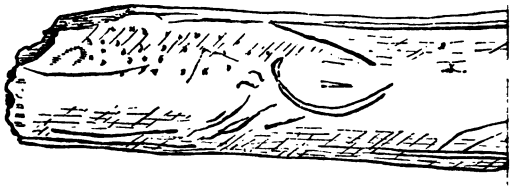
PALEOLITHIC ENGRAVINGS.

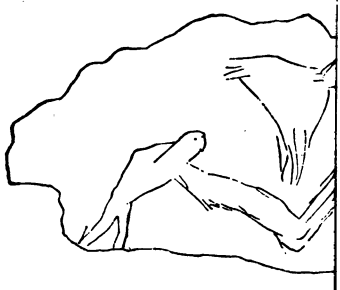
FIG. 1. Engraving of pike on canine tooth of bear. Grotte of Duruthy, southwestern France.

FIG. 2. Engravings of a man, horses, aurochs, and snake or eel on reindeer horn. La Madeleine, Dordogne, France.

FIG. 3. Engraving of seal on canine tooth of bear. Grotte of Duruthy, southwestern France.







PALEOL

FIG. 1. Baton de commandment; reindeer h
La Madeleine, Dordogne, France.
FIG. 2. Reindeer horn; representation of a fi
FIG. 3. Baton de commandment; reindeer h
FIG. 4. Rude engraving on scapula of ox. L

There has also been found an instrument made of reindeer horn, the use of which is as yet unknown. It has been named "Baton (or stick) de Commandement," and is supposed to have been some sort of emblem of authority. Their length was such as to require the principal part of a reindeer horn, and from two to three holes about three-fourths of an inch in diameter were drilled through sideways.*

These artistic manifestations are intended not alone for utility, as in the decoration of implements, weapons, and utensils, but they display art for its own sake. Sketches have been discovered which, like those of many artists of the present day, appear to have been purely for practice or for innate love of the work.† They are mere essays, attempts in which the artists have made various efforts on the same piece without any attempted relation one to the other. The piece known as the combat of reindeer, five animals, Marquis de Vibraye's collection, is an example. Another is a sketch of eight animals, horses and deer, from the Cavern of Lartet, Judge Piette's collection. These are each on one piece; the lines run into each other. The animals represented are without relation to each other. They have even been done from different planes, so that some are upside down. Some are complete; others incomplete. The author of these sketches was only utilizing his material, as does the artist of to-day when he puts many studies on the same canvas. The mammoth engraved on a laminated piece of his own tusk, and the bear on a flat pebble, are purely artistic, are done solely for their art; while the sculpture of the mammoth and reindeer, decoration of the handles of daggers and poignards are such utilization as put one in remembrance of like work done by Benvenuto Cellini. Similar illustrations are found in the various "*Batons de Commandement.*"

The excellent and artistic work shown in these engravings and sculptures is itself strange enough. But the really wonderful and incomprehensible thing concerning them and the civilization belonging to this epoch is that at the close of the period the entire culture painted on its existence disappeared. It passed away and left no trace. Whatever may be the truth concerning this in other parts of the world, it appears to be certain in its relation to western Europe. This leads one to speak of the close of this period, and what has been called by some of the archæologists the hiatus; that is, the gap between that and the succeeding epoch or period.

I have already shown how the human occupation during the paleolithic period was spread generally over western Europe, but whether the subdivision or epochs according to the classification of de Mortillet extended to and were developed in other countries than France has not been determined, and there were persons of both ways of thinking. On one proposition, however, the archæologists seem to be agreed, that there were subdivisions in the paleolithic period, and they are to be traced and recognized by the differences in the human industry according to

* Plate XCIII, Fig. 2, and Plate XCIV, Figs. 1, 3. † Plate XCIV, Fig. 4.

their association and superposition. There are many illustrations to be given. The Grotte de Placard is situated on the banks of the river Tardoire, a branch of the Charente in the department of the same name. A cut of this grotte is given in Plate XC, Fig. 1. By its side is shown a section of the grotte made during its excavation. It is drawn to scale and shows the various strata of earth or débris with which the grotte was filled. The top layer was naturally the last in point of time to be laid down; the bottom was just as naturally the first. The divisions in the scale from the bottom to the top represent the various strata found during the excavation and their component parts show by their differences how they were deposited, each one subsequent to the other, and what were the distinctions between the habits or industries of the man who successively occupied the cavern during the filling of the respective strata.

A.—Strata of small pieces of rock and débris fallen from the roof of the cavern, and separating the archæologic layers: No traces of human industry, and, consequently, man was not present.

B.—A stratum of the same with a fine streak of clay.

C.—The top archæologic strata, 38 centimeters in thickness, belongs to the neolithic period for it contained pieces of property, fragments of polished stone flint hatchets, barbed arrow-heads, together with the bones of modern animals.

D, E, F, and H.—Four strata with the characteristic fauna and objects of industry of the prehistoric period, Madalénian epoch. These four, together with the intermediate strata are nigh 4 meters (5 feet) in thickness.

I.—A stratum of Solutrian industry of the finer and later order. Flint arrow or spear-heads with shoulder on one end.

K.—A stratum of the lower or earlier Solutrian with leaf-shaped implements.

L.—Stratum Moustierian with a characteristic point.

Although this evidence of chronologic and successive occupations can be repeated in many cases, yet it has not been universally accepted, and when accepted it has been with a different classification and nomenclature. The division into epochs according to the classification here adopted is not laid down as a hard and fast rule. It is only tentative and liable to be changed and modified by future discoveries. Whether all these subdivisions of the paleolithic period extended to and were developed in other countries than France has not been determined, and there are persons of both ways of thinking. The principal cause of my willingness to adopt the theory is that it makes a segregation of the objects and implements of the paleolithic period, and gives them a nomenclature by which they can be described and understood; it provides a common language for both hearer and speaker.

The man of the paleolithic period left no monuments. It appears that he built no houses for either the living or the dead. Indeed, it is doubtful if the dead were buried or had any place of sepulcher. The general belief is that he made no pottery. The sole exceptions to this have arisen in Belgium, since the discovery by M. Dupont in the Grotte de Furfooz, and MM. Fraipont and Lohest in the Grotte de Spy.

Portions of the skeleton of paleolithic men are believed to have been found in several places throughout western Europe. It is useless to attempt a full description of them; sufficient for my purpose to say that they have been determined, from investigation of the skull, to have been a long-headed race with retreating forehead and heavy frontal projection. Enough bones have been found to determine that he was of small stature, the extremities being comparatively short but heavy. The sinuses indicate the attachment of heavy muscles, and, consequently, great strength. The typical skulls of this race of men, and which have given their names respectively to it, are that of Neanderthal, the original of which is now at Bonn, and of Cannstadt, which is at Stutgard, both in Germany.

I have said that the human occupation during this period, as indicated by the remains of its civilization, extended generally over the world. What became of man at its close is not at all determined, and has scarcely been studied. In western Europe the scientists have had bettter opportunities than in this country, and, consequently, have made greater discoveries. It is the opinion of some that there was a hiatus between the two races; others, without admitting this, are equally satisfied of the great differences between the two. The neolithic man, so far as concerns western Europe, must have come from the east, that great foundation of civilization and unknown cradle of the human race. He occupied the same territory which was before occupied by paleolithic man, but what became of the paleolithic man is unknown and a mystery. Whether he migrated to the north, following up the Arctic animals when they took their departure; whether the neolithic man came down upon and exterminated him; whether he drove him off or absorbed the remnents, is as yet unknown. It may never be known, but it is a subject for investigation, and the scientists of these countries are engaged seriously in the work of examination.

On the subject of this hiatus or gap, Mr. John Evans says:

> There appears, in this country at all events, to be a complete gap between the river-drift and surface-stone periods, so far as any intermediate forms of implements are concerned; and here, at least, the race of men who fabricated the latest of the paleolithic implements may have, and in all probability had, disappeared at an epoch remote from that when the country was again occupied by those who not only chipped out but polished their flint tools, and who were, moreover, associated with a mammalian fauna far nearer resembling that of the present day than that of the quarternary times.
>
> So different indeed are the two groups of animals that, as has been already remarked, Mr. Boyd Dawkins has shown that, out of forty-eight well-ascertained species living in the post-glacial or river-drift period, only thirty-one were able to live on into the prehistoric or surface-stone period. Such a change as this in the fauna of a country can hardly have been the work of a few years, or even of a few centuries; and yet we must intercalate a period of time sufficient for its accomplishment between the farthest date to which we can carry back the neolithic period, and the close of the paleolithic period as indicated by the low-level gravels. The antiquity, then, that must be assigned to the implements in the highest beds of river-

drift may be represented (1) by the period requisite for the excavation of the valleys to their present depth; plus (2) the period necessary for the dying out and immigration of a large part of the quarternary or post-glacial fauna and the coming in of the prehistoric; plus (3) the polished stone period; plus (4) the bronze, iron, and historic periods, which three latter in this country occupy a space of probably not less than three thousand years. A single equation involving so many unknown quantities is, as already observed, not susceptible of solution.*

And Prof. Boyd Dawkins:

The great changes in the fauna and geography of Britain, at the close of the Pleistocene age, render it very improbable that the cave men were in any way represented by the neolithic tribes who are the first to appear in prehistoric Europe. The former possessed no domestic animals, just as the latter are not known to have been acquainted with any of the extinct species, with the exception of the Irish elk. The former lived as hunters, unaided by the dog, in Britain, while it was part of the continent; the latter appear as farmers and herdsmen after it became an island. Their states of culture, as we shall see presently, were wholly different. We might expect, on *à priori* grounds, that there would be an overlap, and that the former would have been absorbed into the mass of the new-comers. There is, however, no evidence of this. * * *

From the facts at present before us we may conclude that they belonged to two races of men, living in Europe in successive times, and separated from each other by an interval sufficiently great to allow of the above-mentioned changes taking place in the physical conditions of Britain. * * *

From the preceding pages the reader will gather a distinct idea of the physical condition of Britain in the neolithic age, and of the manners and customs of the inhabitants. The population was probably large, divided into tribal communities possessed of fixed habitations, and living principally on their flocks and herds, acquainted with agriculture, and subsisting in a lesser degree by hunting and fishing. The arts of spinning, weaving, mining, and pottery-making were known, and that of boat-building had advanced sufficiently far to allow of voyages being made from France to Britain, and from Britain to Ireland. Traffic was carried on by barter, and stone axes were distributed over areas far away from those in which the stone was found. Tombs also were built, some of imposing grandeur, for the habitation of the dead in the after-world, in which the spirits were supposed to lead a life not very different from that of the living, and at which they were worshiped by the family or tribe, after the manner of the red Indians and many African peoples. * * *

The neolithic implements and the domestic animals and plants, described in the preceding pages, have been discovered over the whole of Europe, with the exception of northern Russia and northern Scandinavia. They imply that the neolithic civilization was long established, and that it underwent so little change, if any, in the lapse of ages that no traces of a change have been preserved to our times. Its duration varied in different countries, and it yielded place to a higher culture in Greece and Italy long before it passed away from central and northern Europe. * * *

The introduction of this civilization is the starting-point of the history of the present inhabitants of Europe. To the neolithic peoples we owe the rudiments of the culture which we ourselves enjoy. The arts which they introduced have never been forgotten, and all subsequent progress has been built upon their foundation. Their cereals are still cultivated by the farmer, their domestic animals still minister to us, and the arts of which they only possessed the rudiments have developed into the industries—spinning, weaving, pottery-making, mining; without which we can scarcely realize what our lives would be.†

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* Evans: Ancient Stone Implements of Great Britain; p. 618.

† W. Boyd Dawkins: Early Man in Britain; p. 265, etc.

Monsieur Gabriel de Mortillet in Le Prehistorique, page 479, discusses this hiatus between the paleolithic and the neolithic periods. He considers that the former belonged to the quaternary geologic period, while the latter belongs to the present, or period actual. He says that "Between these two epochs (that is, between the Madalenian epoch and the neolithic period) " there are differences everywhere; there exists a veritable revolution." And he puts in the form of a table, side by side, the differences.

(1) In the Madalenian the climate was cold and dry, with extreme temperatures.
(2) Existence of the last grand fossil species—the mammoth.
(3) Chamois, marmot, the wild goat in the plains of France.
(4) Reindeer, saiga (antelope), elk, glutton, white bear, in the center of Europe.
(5) Hyena and the grand cat tribe.
(6) No domestic animals.
(7) Human type uniform.
(8) Population nomadic.
(9) Hunters and fishers, but no agriculture.
(10) Stone implements always chipped.
(11) No pottery.
(12) No monuments.
(13) No burials; no respect for the dead.
(14) No religious ideas.
(15) A profound and pure artistic sentiment.

(1) In the neolithic period the climate was temperate and uniform.
(2) The mammoth extinct.
(3) Chamois, marmot, and wild goat have gone to the summits of the mountains.
(4) These animals have emigrated toward the Arctic region.
(5) No hyenas or grand cats.
(6) Domestic animals abundant.
(7) Human type much varied.
(8) Population sedentary.
(9) Agriculture well developed.
(10) Stone implements polished.
(11) Pottery.
(12) Monuments: Dolmens and menhirs; burial of the dead.
(14) Religious ideas well developed.
(15) No artistic sentiment.

This revolution is at once physical and industrial, natural and social. In the physical or natural there have been great changes in the climate, which proves changes of equal importance in the orography and geography, which in its turn was followed by profound geologic modification. This could be done but very slowly, and, therefore, there must have existed a long period of time between the two epochs. This can be assured by certain proofs. In the Grotte de Placard one can see between the uppermost stratum, containing implements of the Madalenian epoch, and that which contains implements of the neolithic period there is to be found a depot or stratum of fallen rubbish, principally small stone from the roof of the cavern, which is completely sterile, so far as concerns archæology, and is 70^{cm} in thickness. The Cavern of Laugerie Haute gives the same evidence and is even more conclusive. Between the strata of the two periods there exists a sterile stratum of 1.30^{m}. In the Grotte de la Vache there exists a thick stratum of stalagmite, sometimes 45^{cm}, between the Madalenian epoch and the neolithic period and the same difference exists between the industrial and

social cultures of the two epochs. The table just given, and which need not be repeated, shows the industries and customs of the two epochs to have nothing in common. There was a substitution complete of the former by the latter. The more advanced have entirely replaced the primitive. It has produced a phenomenon analogous to that which took place in America or the Oceanic Islands after the arrival of the Europeans. There is no progressive or local development, but an invasion of a superior civilization. There are the same changes in the races of the men of the two epochs, but, by atavism, we may find the type of the Chellian man reproduced in the neolithic period. If this be established by future discoveries, it would tend to show a contact of the two populations and that the hiatus was not real, but only a gap in our knowledge of the civilizations of the two peoples.

NEOLITHIC PERIOD.

There was a marked improvement in the civilization of this period over that of its predecessor, the paleolithic. This extended to many things, but the distinguishing feature was the art of polishing or smoothing the stone implements and weapons. Therefore it has been called the polished stone age.

The characteristic implements of this period are the polished stone hatchets, called celts in England and America. They are found like the paleolithic Chellian implements, which preceded them, substantially all over the world, thus showing that this civilization must have endured for a long period of time and comprised an extensive population. The materials differ according to locality, and the form may vary with the requirements of the material.

The standard hatchet in Alaska is made of nephrite, that of the West Indies may be made of shell; there may be also slight differences of form, some having a square top, others being pointed. The Scandinavian hatchets are usually square in section and therein are different from others; they are also much longer, but this arises from the peculiarities of the material. The general likeness in these implements prevails throughout the world notwithstanding the minor differences mentioned. While an experienced prehistoric archæologist may be able to determine from an inspection of the polished stone hatchet from what country it comes and possibly to what locality it belongs, yet the statement is true that they are substantially the same implement and that the invention of the art of polishing, together with the form of hatchet, has passed by communication from people to people, country to country, and descended from generation to generation until it has spread everywhere. A series of the polished stone hatchets, or celts, from almost any one of the United States will stand as a fair representative of the same implement in any other State or country. The single exception to the universality of this statement is from Scandinavia. I shall not at present attempt any general description of the implements, weapons, or ornaments of

this period. That will be reserved until I come to speak of those from the United States, when it can be done more in detail and will not be a repetition.

The stone arrow or spear-head or knife is another equally charateristic implement or weapon of this period. The North American Indian was in the neolithic period of the civilization at the time of the discovery of the continent by Christopher Columbus. Although he used copper as a material for implements, yet it did not displace stone nor was its use sufficiently extended to establish an age of copper.

Another characteristic of the neolithic period was its monuments. Their erection and construction by man began in this period, and are therefore its oldest representatives in every country. In the United States they consist of mounds and earthworks, likewise stone and other forts. In western Europe principally of dolmens, menhirs, cromlechs, and alignments. I will not attempt any description of the monuments of the United States further than to say that many of them are believed to have been places of sepulture. Some of the forts, from their appearance and location, seem to have been erected as places of defense or for safety. But there are vast numbers both of mounds and earthworks which would seem so illy suited for the respective purposes indicated as that it is difficult to believe they were so intended. Many theories and arguments have been presented, but much of it has been of that kind which darkeneth wisdom by words without knowledge.

The excavations into the mounds and other prehistoric monuments in the United States have been unfortunately made more in pursuit of trinkets and to add numbers to the owner's collection than in the interest of science or for the purpose of discovering the history, customs, or civilization of the men who made the mounds. Any description at this time would necessarily be imperfect, and probably all who read this pamphlet will have had as much general and indefinite knowledge of these monuments as could be here given. Those who would know more concerning this subject must be referred to the special works treating thereon.

DOLMENS.

The neolithic monuments of western Europe may be briefly described.

The dolmen was made in the form of a chamber or series of communicating chambers or alley-ways with sides, floor, and covers, and was a tomb.* Its floor and entrance were at about the level of the neighboring surface, and the entire monument is believed to have been covered with earth; thus in ancient times it was a tumulus. †

The covering stones of a dolmen have been found to weigh 5, 10, 20, and 40 tons. ‡ Used for sepulture they may be described as houses for the dead. They are perhaps the earliest form of receptacle for the dead, although the Kistvaen, made of smaller flat stones with sides, ends, top,

* Plates XCV to XCIX.

† Plate XCVI, Fig. 1, and Plate XCVIII, Fig. 2.

‡ Plate XCVII, Fig. 1.

and bottom shaped like a box or chest (Kist) and covered with stones like a cairn, may be older, but they may also have only been the sepultures of a poorer people.

The dolmens, usually square but sometimes round, were made in the form of chambers, sometimes as small as 4 by 6 feet, 4 feet high; sometimes these were 16 feet wide, 30 feet long, and 8 feet high. Most of the dolmens consist of a single chamber, but many have as many as six lateral chambers. They are made of huge flat unhewn granite stones, which are stood on end or edge to form the sides and ends of the chambers.* The covering stones (which are called tables) are large, and a single one is sometimes sufficient to cover the entiremonument.† The dolmens usually have a gallery or corridor leading to the chamber, made in the same way. This is for approach to the chamber. This gallery is about 3 or 4 feet wide and as many or more high, sufficient for a man to make easy entrance. It is sometimes blocked with another slab of granite at the inside and nearest the chamber, sometimes at the outside, and sometimes both. Fig. 2‡ will explain this. In this example the door has fallen in. Their orientation is irregular. They open in every direction, north and south, east and west; but there are more to the south than to the north, and more to the east than to the west. The greater number open towards the southeast. For purposes of comparison the ground plan of several of the important dolmens are here given.§ It will be perceived that though they are all one general type, yet no particular or precise form has been invariably followed in their construction. Each one has its own individuality and differs from any other.

The fine unshaded lines indicate the covering stones. The direction of the opening is indicated by letters SSE, etc.

(1) Dolmen of Kerlescant, at Carnac. This opens to the west. This dolmen is what is usually denominated *Allèe couverte.*

(2) Dolmen of Kervilor, at Trinitè-sur-Mer. Opening to SSE., one side square and one side round.

(3) Dolmen du Rocher, at Plougoumelen. Opening to SSE.

(4) Dolmen of Crucuno—same as Fig. 1.‖ Opening to SE., chamber rectangular.

(5) Dolmen of Keroed-Kerzu, at Crach. Opening to east, circular chamber.

(6) Dolmen of Ben-er-Groah, at Lochmariaquer. Opening south, two successive circular chambers.

(7) Dolmen of Kervihan, Carnac. Two chambers, semi-circular, with alley between. Opening SSE.

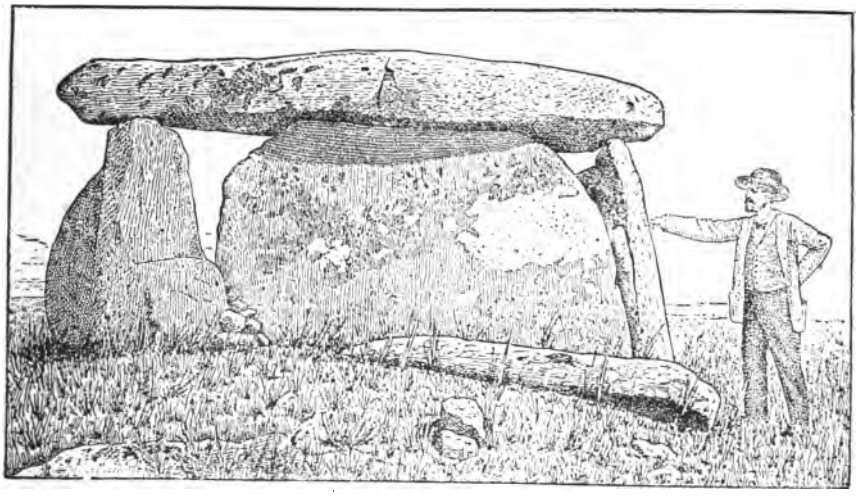
(8) Dolmen of Keriaval, near Plouharnel-Carnac. Three lateral chambers, opening east.

(9) Second dolmen of Manè Kerioned, near Plouharnel. This is one of three in the same tumulus—side by side—opening south, and is elaborately sculptured on the face of the supports.

(10) Three dolmens of Rondessec, at Plouharnel, all under the same tumulus, opening SSE. In one of these was found a pair of gold bracelets, one of which is still to be seen at Pere Gaillard's, Plouharnel.

(11) Small type dolmen of Kermario, Carnac. Opening to southeast.

* Plate XCV, Fig. 1; Plate XCVIII, Fig. 1.
† Plate XCVII, Fig. 2.
‡ Plate XCV.
§ Plate XCIX.
‖ Plate CVII.



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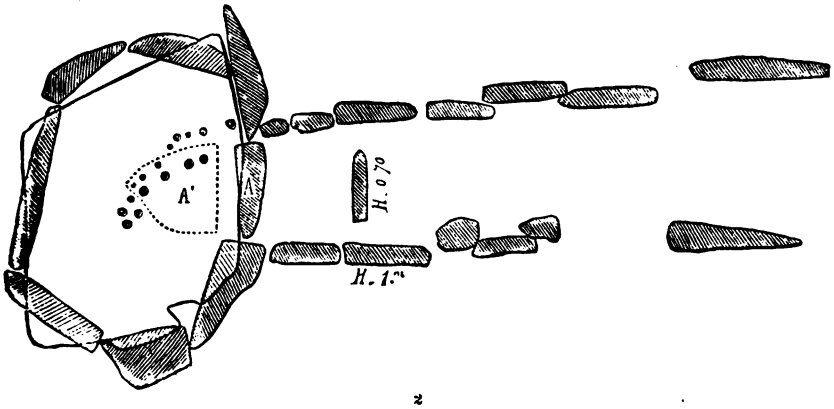
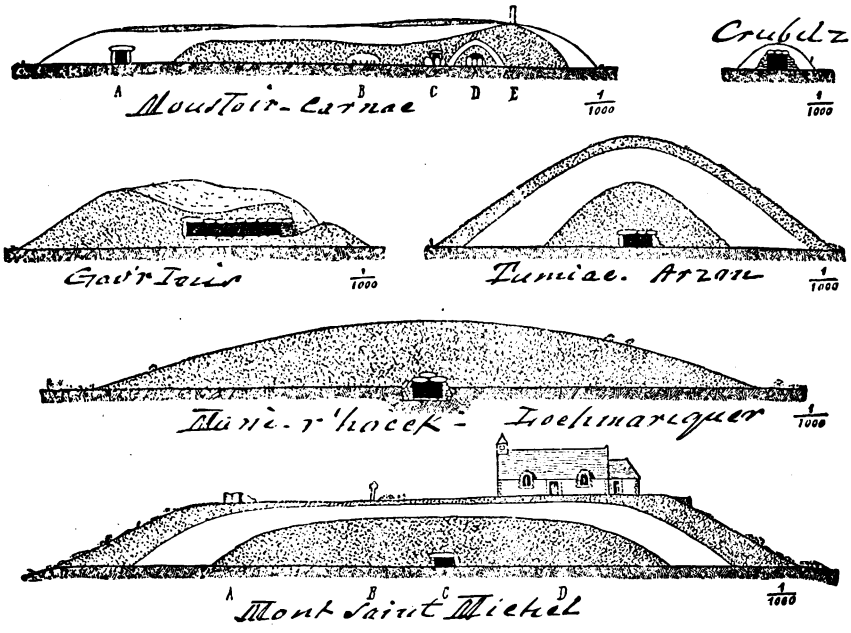


2

NEOLITHIC MONUMENTS—DOLMENS.

FIG. 1. Dolmen of Palo de Vinha, Portugal.

FIG. 2. Ground plan of dolmen of Palo de Vinha, near Evora, showing the stones on edge forming the gallery, chamber, and door. The light line around shows the covering stone with a group of cup-markings on the under side.



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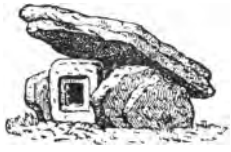

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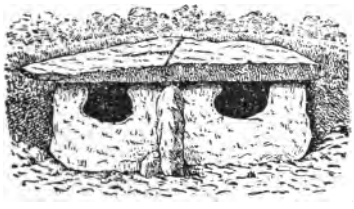

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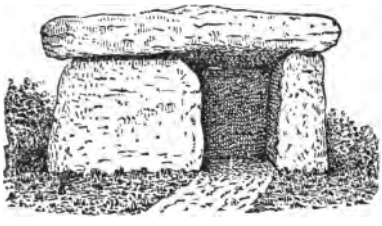

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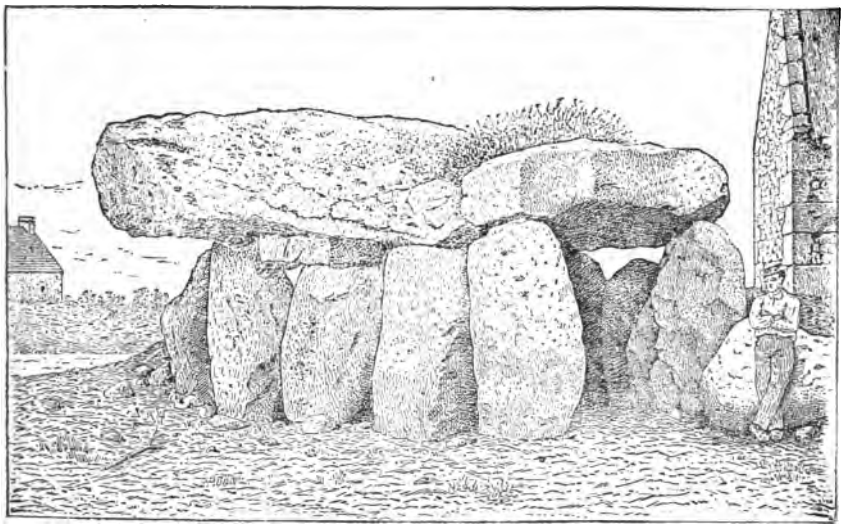
NEOLITHIC MONUMENTS—TUMULI AND DOLMENS.

FIG. 1. Tumuli in Brittany.
FIG. 2. Dolmen d'Ala Safat, Palestine.
FIG. 3. Double dolmen, near Veevajapett, southern India.
FIG. 4. Dolmen de Thizay, Indre-ét-Loire, France.



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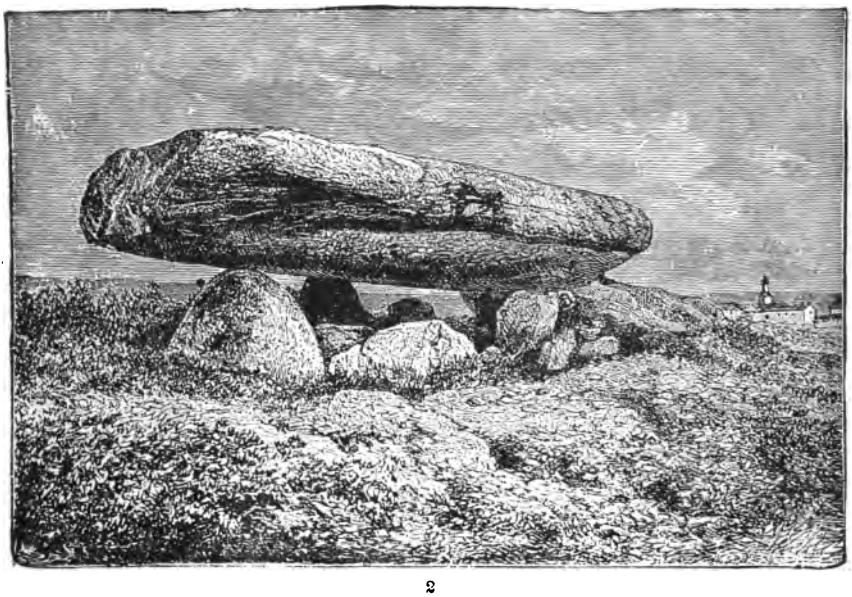

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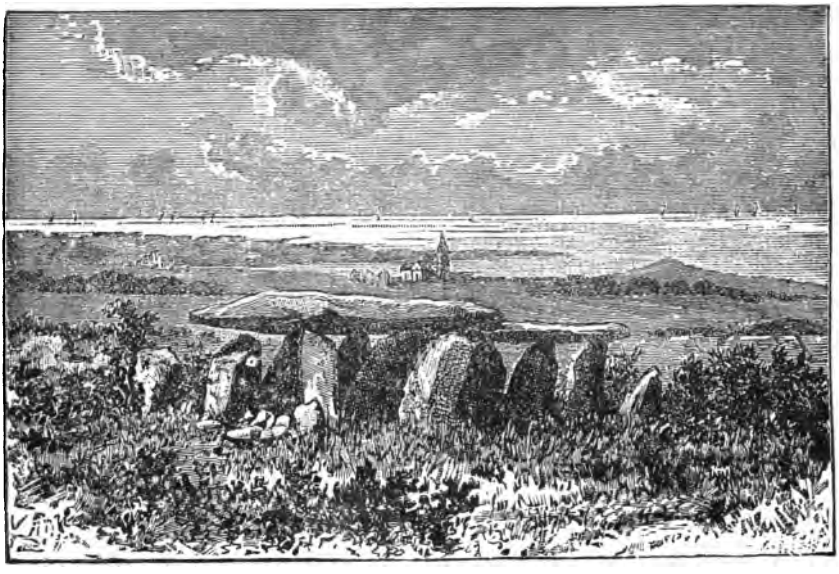
NEOLITHIC MONUMENTS—DOLMENS.

FIG. 1. Dolmen of Crucuno, Morbihan, Brittany.
FIG. 2. Dolmen of Lochmariaquer, Morbihan, Brittany.



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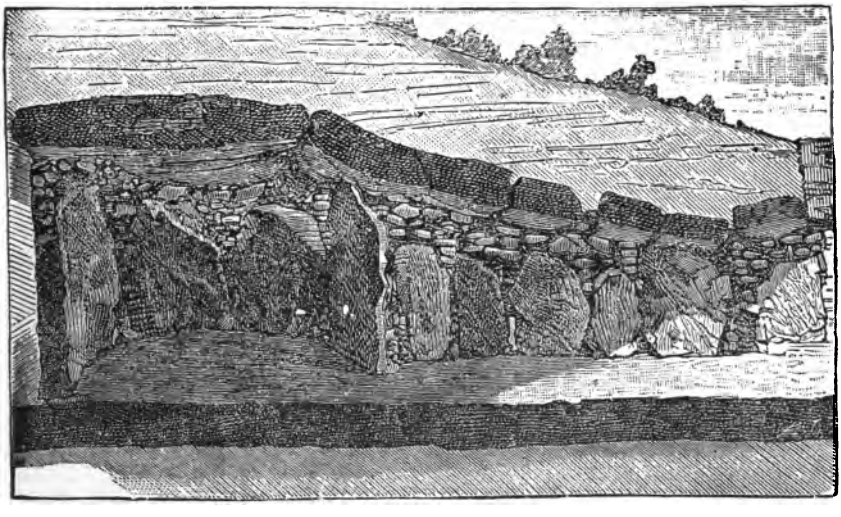

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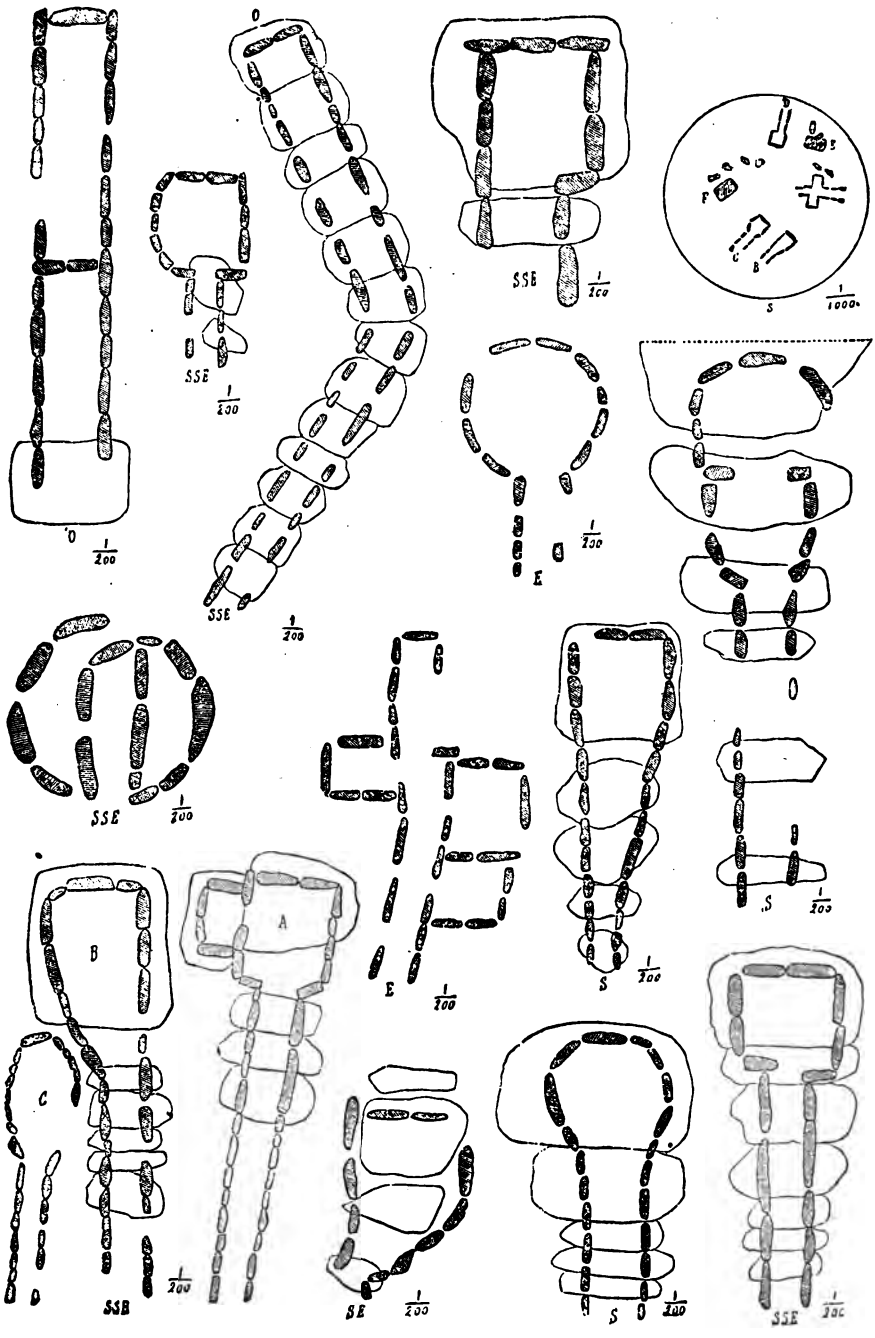
NEOLITHIC MONUMENTS—DOLMENS AND TUMULUS.

FIG. 1. Dolmen of Grand Island.

FIG. 2. Dolmen and tumulus of Kercado near Plouharnel-Carnac, Morbihan. Section showing the chamber and the corridor or covered way by means of which second and subsequent interments were made.



NEOLITHIC MONUMENTS—GROUND PLANS OF DOLMENS IN BRITTANY.

(12) Dolmen of Manè Lud, at Lochmariaquer. Opening south.
(13) Dolmen (with tumulus) of Kercado, Plouharnel, SSE.
(14) Tumulus of Pornic, Loire-Inférieure, in the upper right-hand corner. This contains several dolmens opening in different directions. A opens to the east. B and C to the southwest. D to the north. E and F in ruins.

It is believed that the interments were made continuously in the same sepulcher (as is done partially in our own vaults), a practice which prevails to a certain extent in the country to the present day. When the dolmen or tomb became full, the skeletons could have been taken out and deposited in an ossuary.

It was once the fashion to speak of these monuments as having belonged to the Druids. This seems to have been a tradition that has grown up within historic times and long after the Druids had passed away. The dolmens belonged as well to the age of bronze as to that of polished stone. Incineration and inhumation were both customary, but the former method pertains more to the bronze age.

There are about thirty-five hundred dolmens in France. They are plentiful in the center, south, and west, but rarer in the north and east; plentiful in Great Britain and Ireland, in Spain and Portugal, in Denmark and Sweden; some in Belgium and Holland, the Rhine country, and Western Germany; none in Norway; almost none in Italy; none in Eastern Europe. The city of Dresden marks about the dividing longitudinal line. They are found on the coast of Northern Africa between Morocco and Tripoli, in Palestine, in Asia, in South and Central America, but not in North America.

Many of the dolmens are now covered with earth, and these have been called tumili. It is believed by those best qualified to judge, after the longest experience and closest examination, that all have been at one time so covered. One reason for this belief is that it is universal to find the gallery, corridor, or covered way made of the same kind of stones in the same way, on the same level, and leading from the principal chamber, gradually narrowing in both width and height to what would appear to have been the circumference of the tumulus. In this regard the dolm n now without a tumulus corresponds exactly with those covered by one. Some of these corridors are 40 and 50 feet in length. In this way the tomb could be covered, the monument completed, and yet the entrance be easily opened and entered upon the occasion of a second or subsequent interment.

The covering of these tumuli consists of layers of broken granite alternated with layers of clay and mud from the seashore and vegetable earth from the neigboring surface.

The tumulus of Gav'r Inis has a dolmen remarkable for the sculpturings. It is 8 feet by 7, 5 feet 8 inches high, with a corridor or alley 14 feet long, 4 feet 6 inches wide; 5 feet 4 inches high, while the tumulus crowning it is 180 feet in diameter and was 30 feet high. (See Plate XCVI.)

Tumiac at Arzon is 100 feet in diameter and 65 feet high; Manì-r-

'hoeck is 300 feet in diameter and 30 feet high; Mane Lud 300 feet long, 150 wide and 30 feet high; Mont Saint Michel 320 feet long, 120 feet wide and 80 feet high; Kercado is about 100 feet in diameter and 20 feet high.

MENHIRS.

The dimensions of some of the menhirs is as follows:

Penmarck, 25 feet high;* Cadiou, 28;† Mount Dol, 31; Plouarzel, 36½; Plesidy, 37, and Lochmariquer, 67½. The latter, fallen and broken, is 13½ feet wide and 7½ feet thick, and weighs 347 tons. There are seven hundred and thirty-nine of these in Brittany. The menhir stands single and alone. When arranged in parallel lines, as they sometimes are, they are called alignments.

ALIGNMENTS.

The Province of Brittany has twenty-three alignments—one-half of those in all France. The department of Morbihan and Finistère have, together, seventeen of these. Carnac has in its immediate neighborborhood six out of these seventeen. These six alignments represent three thousand menhirs.

Menec, near Carnac, has eight hundred and thirty-five menhirs, arranged in eleven parallel lines, 3,778 feet in length, and 328 feet in breadth at the head, tapering to 200‡ feet at the tail. It has at its head a cromlech of sixty-two menhirs.

Kermario has six hundred and seventy-eight menhirs, no cromlech, nine parallel lines, 4,037 feet in length—same width as Menec.

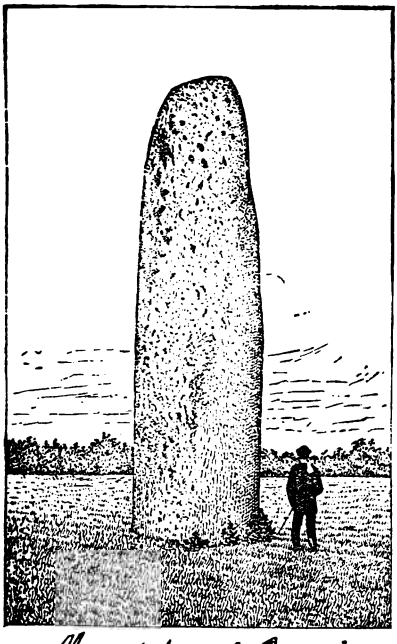
Kerlescant has two hundred and fifty-eight menhirs, a cromlech square of thirty-nine menhirs, thirteen lines, 1,000 feet in length—393 feet width at the head and 164 at the tail.

Erdeven has thirteen lines, one thousand one hundred and twenty menhirs, 6,886 feet in length, 836 in width at the beginning, and 180 at the end.

About one-half of these have been overthrown and are lying on the ground. Nearly 10 per cent. should be added for the menhirs known to have been destroyed in modern or historic times. Without doubt the gaps now existing were once filled. This would double, at least, the number. These monuments have served as stone quarries for the neighborhood, and doubtless the great castles and churches of the early ages were built therefrom.

There is on the menhirs no mark of tool or quarrying, yet I think they were quarried. They are so much weathered that all marks are worn away. Look at the weathering on the top of the menhir of Penmarck (Pl. C, Fig. 2). No traces of a quarry have been discovered, though the granite of which the menhirs are formed is the local rock, coming always and many times quite to the surface. The menhirs have evidently been planted. In most cases they stood on the surface with-

* Plate C, Fig. 2. † Plate C, Fig. 1. ‡ Plate C, Fig. 3.



Menhir of Cadiou

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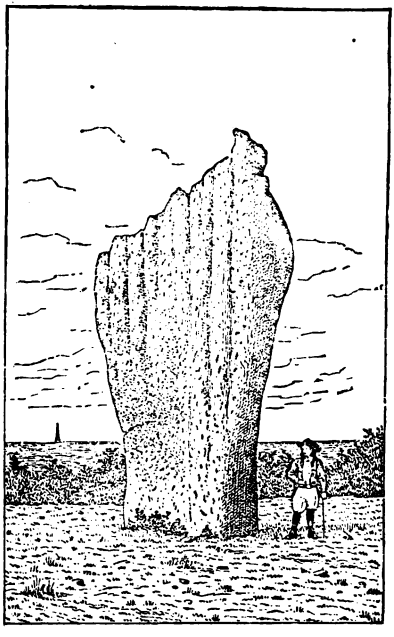

– of Penmarck

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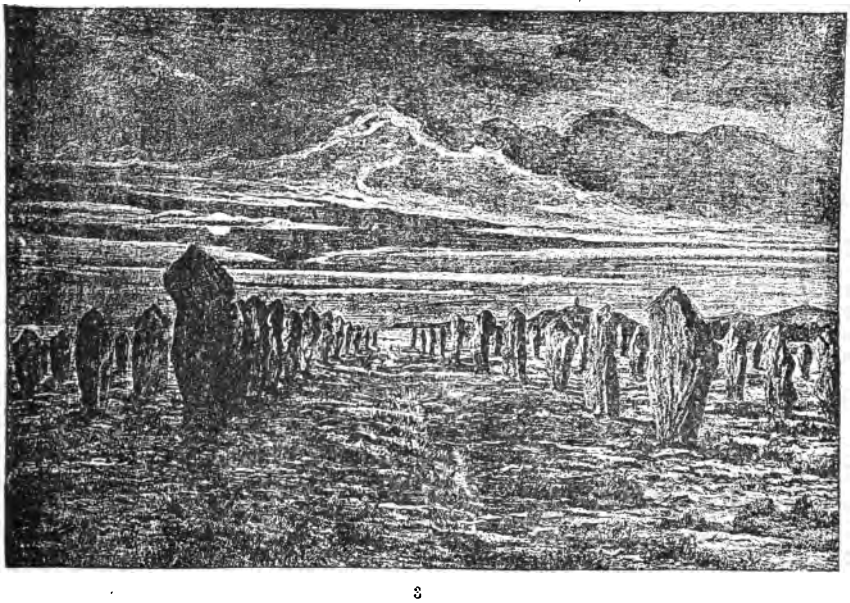

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NEOLITHIC MONUMENTS—MENHIRS AND ALIGNMENTS.

FIG. 1. Menhir of Cadiou.
FIG. 2. Menhir of Penmarck.
FIG. 3. Alignment of Menec, near Carnac.

out any foundation, but foundations had been built where needed. In many cases the smaller end of the stone was downwards.

Flint implements and chips, and broken pottery are found about and among the alignments as elsewhere over the country, especially around the foot of the menhirs, showing a prehistoric occupation; but no traces of the use or purposes of the menhirs or alignments have ever been discovered. There have been many theories broached but no facts adduced sufficient to support them. They have been called military camps or religious or other rendezvous for the people. They may have been tents. No trace has been found of their use as burial places, and so far as established by ascertained fact, the popular idea is as near the truth as any other, viz., that they were the columns of a sacrilegious invading army, turned to stone by the wrath of an offended God.

SCULPTURINGS.

Many of these stones or monuments have marks or sculpturings on them. The menhirs of the alignments have cup markings only, and these are rare. In some cases they have been marked in modern times with crosses, made sometimes by religious devotees, sometimes by the priests, done in order to prevent or break up any chance remaining pagan custom of worshipping, revering, or employing these stones. The dolmens are marked with various signs. These might be set out in full but for want of space, though none however have any discovered signification.

LAKE DWELLINGS.

Switzerland is the country of lake dwellings, because it abounded in lakes, and the mountains were not inviting dwelling places; but lake dwellings extended over the adjoining districts of France, Italy, and Germany, were similarly situated, and they have lately been found in Scotland.

The lake dwellings were, as their name imports, human habitations on the lakes. They were built near the shore, consisted of houses, and possibly other structures, such as shops, barns, stables, granaries, erected on piles placed in the lake bottom, and which, standing above the surface of the water, were cut to a general level and then floored over for the entire settlement. The houses were connected with the mainland by a bridge (probably with a draw), the piles of which it was constructed being often found.

There have been differences of opinion as to the houses. Keller supposed them to have been square or a parallelogram, while Dr. Gross believes them to have been round. They were destroyed before the beginning of history, and practically all that is known of them is derived from the discovery of the relics. The water has preserved the piles so that they are frequently visible from the surface, though they are usually decayed to the surface of the earth at the bottom of the

lake. Many times, as at Robenhausen, the lake has filled up with peat and turf, and the piles and other objects are only found by digging.

Such is always the case with the *terremare* of northern Italy. These were probably lake dwellings similar to those of Switzerland. The evidence of the use of piles is manifest, and from the relics found it is believed that they were contemporaneous in time and in civilization.

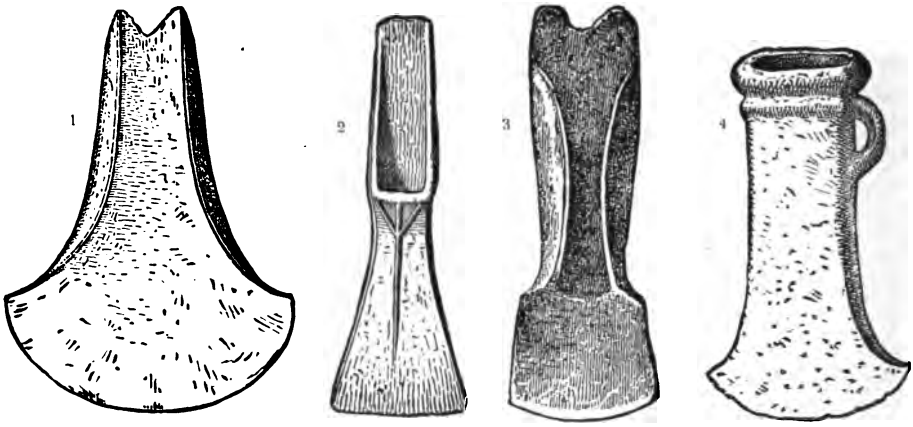
The greater number of lake dwellings are supposed to have been over the water, although near the shore and where it was shallow, but many (the number can not be estimated, owing to the greater facility for decay and destruction) were on the mainland.

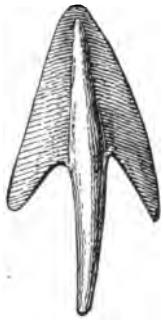
The era of lake dwelling forms no epoch in itself; they were only the incidents of location. The dwellings on a given spot may have been removed again and again, even in the same age, the preceding settlement having been destroyed, possibly by fire, possibly by an enemy. At Robenhausen, which station has given its name in France to the neolithic age, there were three prehistoric occupations, one on top of the other, and each was destroyed before the next began. The tops of each set of piles are from 3 to 5 feet higher than the earlier set. The number of houses in the first occupation has never been estimated; that of the second has been estimated at thirty, and the third and last at fifty houses. The settlement covered nearly three acres and contained about 100,000 piles.

Keller reported in 1879 one hundred and sixty-one prehistoric lacustrine stations, and I can suppose the number discovered has doubled since then.

The occupation of the lakes for dwellings continued through the bronze and iron ages, as well as during that of stone. These different occupations were not always continuous, perhaps never were. In many places, notably at Morges, on Lake Geneva, there are three different stations occupied by prehistoric man, each independent of the other—all within a space of 500 or 600 yards. The first was called "The Church," the implements of which were all stone—no metal; the second, Roseaux—a mixture of stone and the straight flat bronze hatchets belonging to the earliest period; the third, the great city of Morges, in which the implements found, to the number of five or six hundred, all belonged to the fine age of bronze—no stone. Here there could have been no contemporaneity—no mixture. Each must have been destroyed before the other began. That this could be, is proved from what we know from history, for the present town of Morges has existed for a thousand or fifteen hundred years, until 1854, without a suspicion that these other three towns had consecutively existed on its site.

In the Lake of Geneva there are fifteen or twenty stations belonging to the neolithic age and twenty-five or thirty to the bronze age. In the common cantonal map there is shown in Lake Bienne two stations of the stone age, four of bronze, and four of iron—in Lake Morat five of stone, four of bronze, and two of iron—in Lake Neuchatel nineteen of





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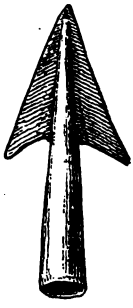

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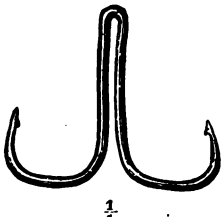

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BRONZE IMPLEMENTS.

FIG. 1. Bronze hatchet (first style); standard type.
FIG. 2. Bronze hatchet (second style); standard type.
FIG. 3. Bronze hatchet (third style); standard type.
FIG. 4. Bronze hatchet (fourth style); standard type.
FIG. 5. Bronze arrow-point; stemmed.
FIG. 6. Bronze arrow-point; socketed.
FIG. 7. Bronze fish-hook; single barb.
FIG. 8. Bronze fish-hook; double-barbed.

stone, sixteen of bronze, and four of iron. This is highly imperfect, for I know many stations not noted, and where noted as one they really include several stations. At Chevroux, Lake Neuchatel, I found twelve stations, of which seven belonged to the neolithic and five to the bronze age, yet they are noted at only one of each. An idea of the extent of these stations may be obtained from the fact that they contain from ten thousand to one hundred thousand piles. I drew one out at Estavayer, Lake Neuchatel, and brought it home, and it and its cast are now in the Smithsonian Institution. At the station of Wallishofen, Lake Zurich, discovered about three years since, there have been found no less than two thousand bronze hair-pins, some long with large and beautiful heads, which, when polished to their original gold color, must have given a gorgeous appearance to the female head-dress of that age.

BRONZE AGE.

So called because bronze was the material of which the cutting implements were made. The progress in its manufacture is plainly indicated in both form and method. The material is not a natural primitive one, but a combination of copper and tin in varying proportions of 9 to 1. It was not made in Europe, but seems to have been brought from Asia, and was used over many times by recasting. No less than fifty-seven foundries of bronze have been discovered in France, and a proportionate number in Italy, the one at Bologna having no less than fourteen thousand pieces broken ready for melting and recasting. The people of the bronze age in Europe were the descendants of those of the neolithic age, and their hatchets were at first made in the same general form as the polished stone hatchet of their ancestors. They were straight, flat, thin, and made by hammering. Increased strength was obtained by hammering the edges into projections which afterwards increased to wings. This was the second step of progress. Then the hatchets were cast in moulds with wings and a stop which prevented the splitting of the handle. Lastly was invented the socketed hatchet, into which the handle (bent at the poll) was inserted. Nearly all the latter forms had an eye with a hole therein, on the inside of the hatchet, by which it could be lashed to the handle which prevented the edge from working outwards.*

PALEOLITHIC IMPLEMENTS IN AMERICA.

The paleolithic implements of the United States are similar to those of Europe in form, appearance, and mode of manufacture, though not usually so well finished. If classified according to Mortillet, they would belong to the earliest epoch of the paleolithic period—the Chelléen. The investigations concerning these implements have not been very profound, nor has it been settled to the satisfaction of all prehistoric archæologists, perhaps not even to a majority, that they are truly paleolithic implements. There have been various contentions concerning this.

* Plate CI, Figs. 1, 2, 3, 4.

They have been discovered in almost every State of the United States, and if they be accepted as such, their presence would prove the occupation of America by man during that period. This presence and occupation, and the consequent antiquity seems to have been established by the discovery of implements of human manufacture which it is not possible to avoid calling paleolithic, at various localities in the United States. These implements have been found to the number of several hundred by Dr. Abbott in the gravels of the Delaware River, as they were washed from the glacial terminal moraine and deposited at Trenton, New Jersey; also by Miss Franc E. Babbitt, in the gravels of one of the terraces of the Mississippi River, at Little Falls, Minnesota. Similar implements have also been found in the gravels of the Little Miami River, at Loveland, Ohio, in White River, Indiana, and in the Columbia gravels of the railway cuts south of Chester, Pennsylvania. The association and condition of these finds would seem to satisfactorily establish the antiquity of man's occupation in this country. Similar implements have been discovered on the surface in almost every State.

A circular, No. 36, was issued by the Smithsonian Institution in January, 1888, in which the following questions were put for information concerning these implements:

Question 1.—How many of these rude stone implements have you in your collection?

Question 2.—Of what material are they made?

Question 3.—Where have they been found?

(1) As to locality.

(2) Position, condition and associated with what objects.

(3) Whether on or under the surface, and if so, at what depth, and in what kind of geologic formation.

(4) Were they found in mounds, tombs, or other ancient structures.

(5) Were any other ancient implements found with them, and if so, of what kind.

(6) Did their deposit seem to be accidental or intentional.

(7) Have they been described in any publication, and if so in, what, and where can it be obtained.

(8) Can you forward specimens (as many as possible) to this Museum in exchange for publications or duplicate specimens.

Answers and information responding to these questions not heretofore given are still desired, to the end that the record may be kept up.*

Cuts of certain paleolithic implements were given for information and comparison, among which were the following:

* The information received up to date in reply to this inquiry is embodied in a paper in this report entitled "Results of an inquiry as to the existence of man in North America during the paleolithic period of the stone age."

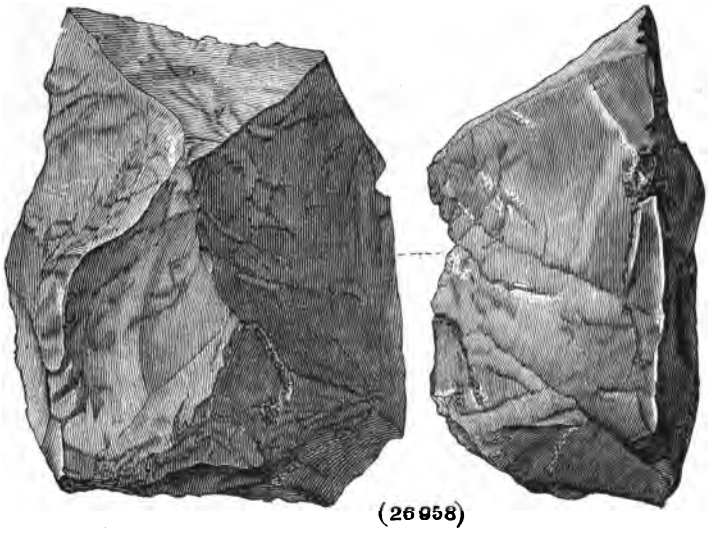

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Fig. 1.

JASPERY FLINT.

(Trenton gravels, New Jersey. Received from Dr. C. C. Abbott.)

Primitive Industry: Chap. XXXII, p. 471.

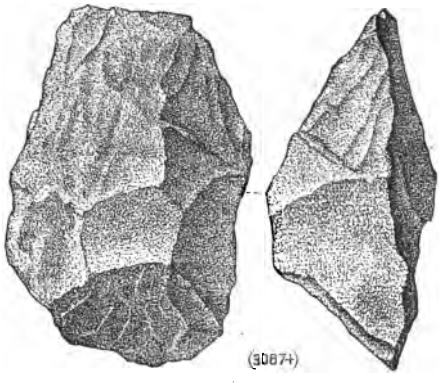

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Fig. 2.

GRAY QUARTZITE.

(Banks of the Schuylkill, Berks County, Pennsylvania. Received from A. F. Berlin.)

American Antiquarian: Vol. I, p. 10.

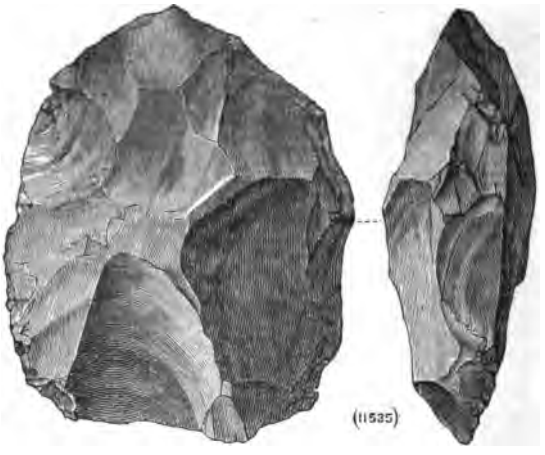

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Fig. 3.

BLACK FLINT.

(Wyoming Territory. Collected by Dr. Joseph Leidy.)

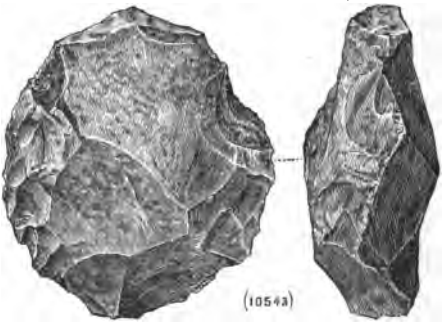

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Fig. 4.

BROWNISH-YELLOW JASPER.

(Wyoming Territory. Collected by Dr. F. V. Hayden.)

These two implements* came from the Bridger Basin in the Uintah Mountains in southwestern Wyoming and Northern Utah, explored by Professor Hayden and Dr. Joseph Leidy. Report of the U. S. Geological Survey, 1872, p. 652.

* See Figs. 3, 4.

This implement* was made from a pebble which has been split in two. The upper or flat surface shows the chips with the bulb of percussion by which it was worked. A portion of the rolled surface of the pebble is left untouched, and shows in the cut, proving beyond doubt its intentional and consequently human manufacture. It is impossible that these fractures should have been either natural or accidental. This exhibition of the rolled surface, the crust of the pebble, is a peculiarity belonging chiefly to the valley of the Potomac, where they have been found in considerable numbers. I have ventured to name this the Washington implement, in contradistinction from that other kind which is chipped all over, shows no trace of the crust of the pebble, and which Dr. Abbott once named "Turtle back," but is now by his consent changed to "Trenton implement."

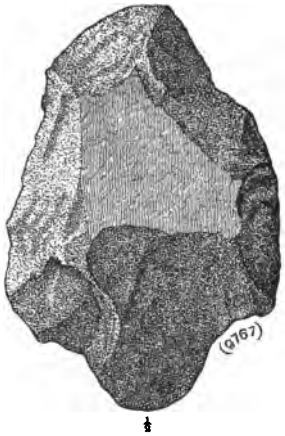

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Fig. 5.

YELLOWISH-BROWN QUARTZITE.

(Pamunkey, Charles County, Maryland. Collected by O. N. Bryan.)

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Fig. 6.

INDURATED CLAY SLATE.

(Pamunkey, Charles County, Maryland. Collected by O. N. Bryan.)

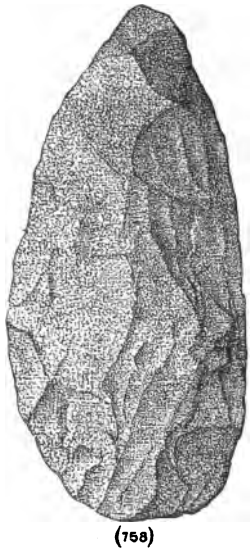

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Fig. 7.

REDDISH QUARTZITE.

(Georgetown, District of Columbia. Collected by James Webster.)

* See Fig. 5.

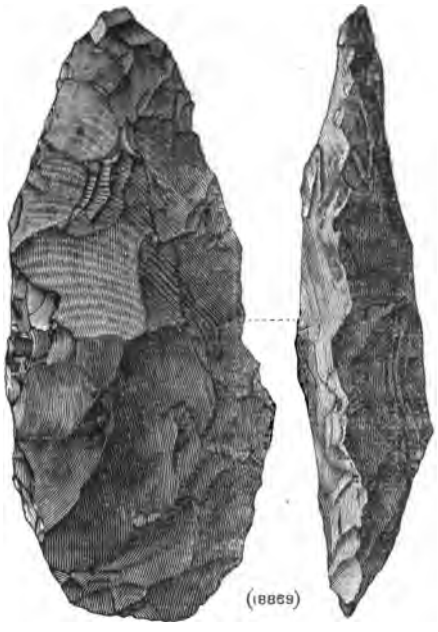

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Fig. 8.

PALE GRAY FLINT, having somewhat the appearance of agatized wood.

(Austin, Texas. J. Van Ostrand.)

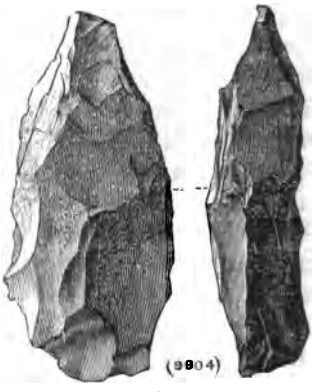

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Fig. 9.

YELLOW CHERT (from a shell heap on the Tennessee River, adjoining and opposite Savannah, Tennessee).

(Collected by J. Parrish Stelle.)
S. I. Report, 1870, p. 414.

These implements* are to be remarked as representatives of a possible new type. They are smaller and thinner than the others, and are

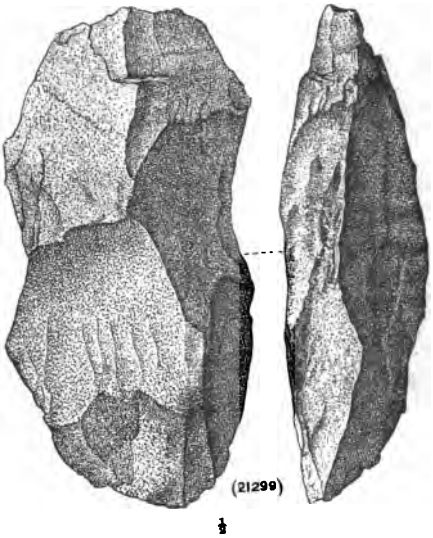

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Fig. 10.

PORPHYRITIC FELSITE.

(Raleigh, North Carolina. Collected by Howard Hayward.)

* See Figs. 6, 7, 8, 9.

found more frequently in the river valleys and on the lowlands, while the others are found more on the bluffs and highlands. They may be found in the neighborhood of mounds and other places of apparent Indian occupation, while the larger kind do not always seem to be.

This implement* corresponds closely in appearance, material, and mode of manufacture to the average paleolithic implement; but there is a remarkable difference in that this is notched on the edges, apparently for the purpose of attaching a handle with a withe or thong, and some of them show traces of such usage by these edges being worn smooth. This feature is unique and has never been found belonging to an undoubted paleolithic implemment. The question whether they are paleolithic must therefore be held in abeyance and for further examination. They have been reported principally from the Atlantic slope. The United States National Museum possesses about sixty-five specimins. It has been suggested that these implements have been used as agricultural digging implements, also that they have been used as adzes for the making of canoes and for scooping out soap-stone pots and vessels. If any of these uses should be accepted it would decide prima facie that they were not paleolithic.

The following is a résumé of the information and contributions received in response to this circular.

State.	Answers received.	Implements reported.	Number sent.	Original number in Museum.	Total.
Maine	9	196	19	3	218
Vermont	6	70	27	.....	97
Massachusetts	14	79	17	96	393
Connecticut	3	8	.....	19	27
New York	20	530	95	7	632
New Jersey	3	348	2	41	591
Pennsylvania	20	1,000	180	39	1,219
Maryland	4	33	.....	59	92
District of Columbia	8	869	239	298	1,406
Virginia	3	400	26	13	439
North Carolina	2	13	23	5	41
South Carolina	3	.....	.....	.....	.....
Georgia	.....	.....	.....	10	10
Florida	1	20	.....	31	51
Alabama	3	1	8	25	34
Texas	1	.....	.....	6	6
Ohio	29	1,215	71	66	1,352
Indiana	13	489	26	26	541
Illinois	17	189	.....	23	212
Kentucky	2	25	.....	15	40
Tennessee	5	48	30	18	96
Michigan	9	224	6	.....	230
Wisconsin	6	21	.....	6	27
Iowa	3	Few	10	2	12
Missouri	7	335	10	5	350
Arkansas	2	86	.....	4	90
California	5	57	.....	38	95
Minnesota	2	.....	.....	48	48

* See Fig. 10.

State.	Answers received.	Implements reported.	Number sent.	Original number in Museum.	Total.
Oregon				7	7
Kansas	5				
Nebraska	1			3	3
Colorado				8	8
Utah	1			25	25
Wyoming				4	4
Arizona	1				
Canada	1	106			106
Total	209	6,762	789	950	8,502

RECAPITULATION.

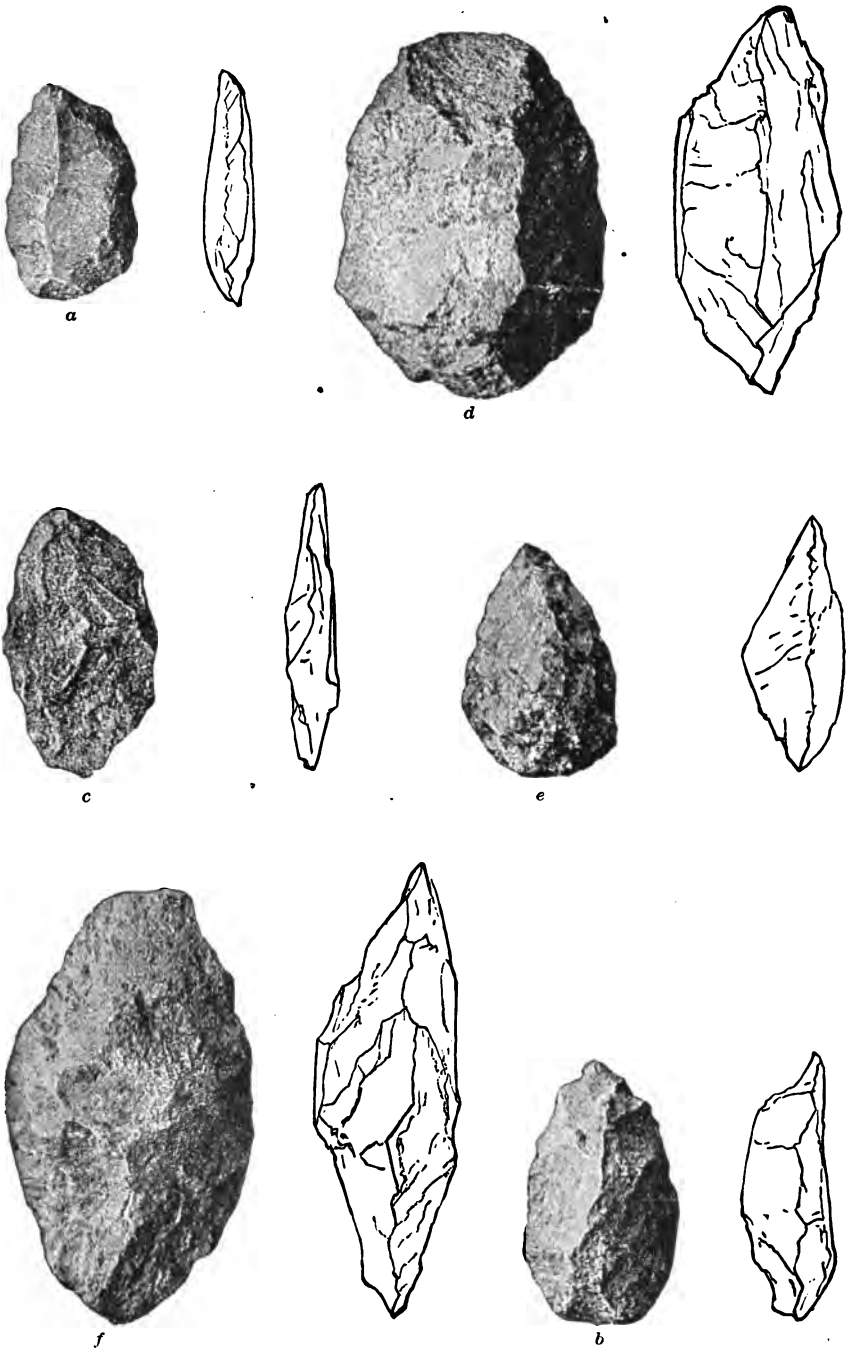
Original number in Museum	950
Number sent	789
Number of implements in Museum	1,739
Total implements reported as in United States	8,502

There is a question yet to be examined, whether certain leaf-shaped implements (see Fig. 15), the same being long, thin, and well-formed chipped points (spear-points), made frequently of the same material, and found associated with the ruder forms just described, may not also belong to the paleolithic period, but not to the same epoch. These may possibly be found to belong to a later epoch which corresponds with the Solutréen of Europe. This, however, waits further investigation.

NEOLITHIC IMPLEMENTS IN AMERICA—INDIAN RELICS.

The civilization of the aboriginal occupants of the United States, whether mound-builders, or the red Indian in possession of the country at the time of its discovery has been assigned to the neolithic period. Many copper implements have been found, and were used, but there was never such general use of that metal as to establish what might be called the epoch of copper. Stone does not appear to have been superseded as material for implements. This can not be attributed to scarcity of copper, but rather to its want of favor among the savages. They were about as difficult and tedious to make as were the stone implements, while, when made, they were much softer and more inefficient. Altogether, they do not seem to have possessed sufficient advantages over the stone implement to have displaced it. The principal objects and implements, whether tools, weapons, domestic articles, those for ceremony, gaming, and many for ornamentation, continued to be made of stone. Pottery was, of course, made and used to a great extent. Some domestic articles and many for personal decoration were of bone and shell.

Illustrations of types of these objects taken from the originals in the National Museum will be given in the following pages.



RUDE CHIPPED IMPLEMENTS FROM THE DISTRICT OF COLUMBIA. (See page 630.)
(Half natural size.)

ARROW OR SPEAR-HEADS, OR KNIVES.

These are of almost every form, material, and size. With but slight differences in these qualities, they are found all over the United States, and are substantially the same as those of the prehistoric ages in all parts of the world. Their various uses, as indicated in the title, are not known with certainty in all cases. Their difference in size

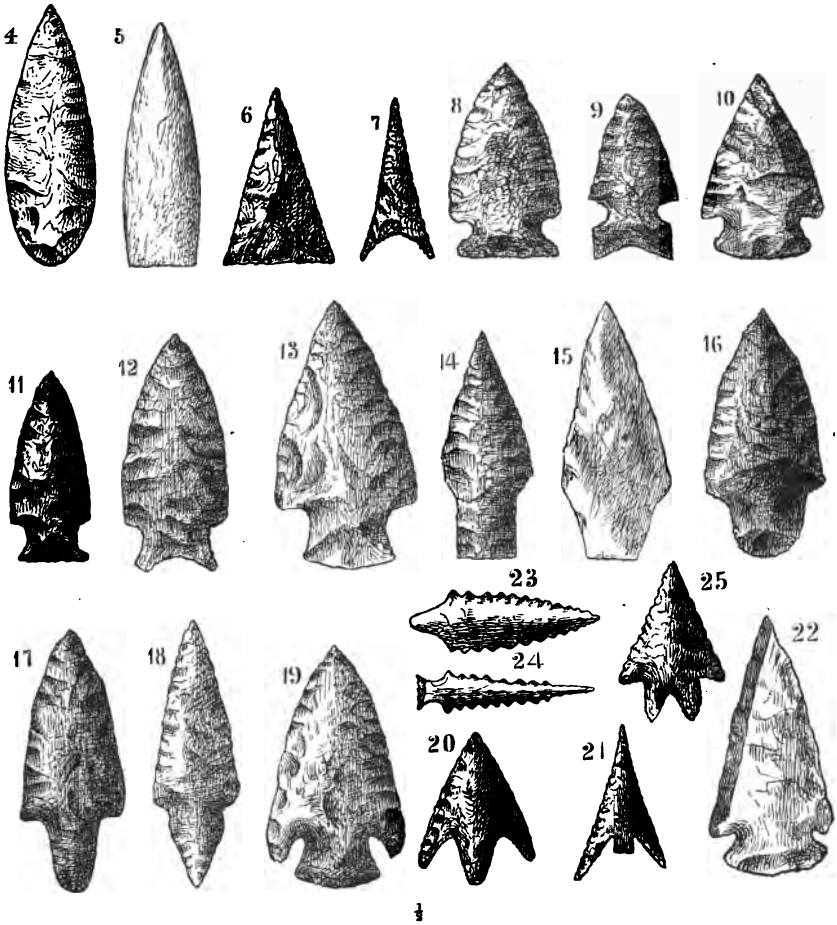


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Fig. 11.

ARROW-HEADS.

Different forms, from various localities in the United States.

seems to have indicated the difference in name. Except for this the same implement might have served as either arrow or spear-head or knife. A tang indicates attachment to a shaft or handle, and this, if found, would determine its purpose. Instances of this attachment occur on the Pacific slope, but in the eastern half of the United States specimens bearing such evidence are practically unknown. They might have been fastened with a cord, or with some adhesive substance.

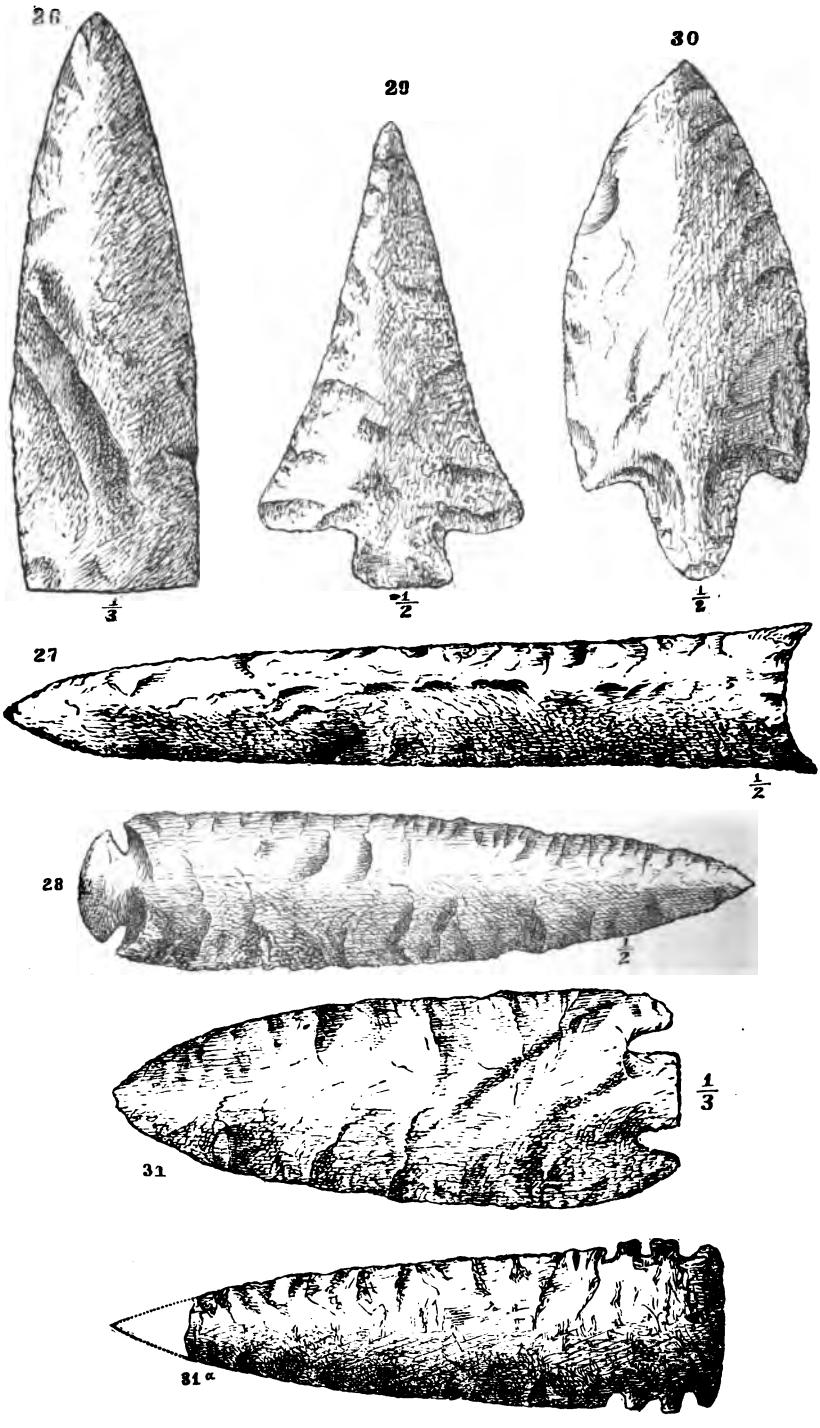

Fig. 12.

SPEAR-HEADS OR KNIVES.

Every finder should examine his specimens carefully for evidences of any sort of attachment, and if found the specimens should be forwarded for examination.

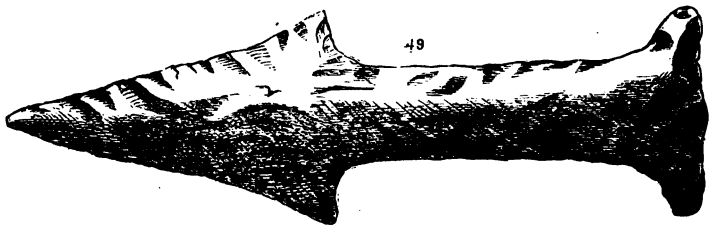

Fig. 13.
CHIPPED DAGGER OF GRAY FLINT.
(Cat. No. 9330, U. S. Nat. Mus. From a mound in Alabama. Collected by N. T. Lupton.)

The Museum possesses one specimen of a knife or dagger with the handle complete, chipped from a single piece of flint somewhat after the fashion of like implements from Scandinavia. It also possesses a dozen or more specimens of knives, principally from California, the handles being short, with the flint blade inserted and fastened with bitumen. In some cases the handle has been preserved, but in others the bitumen alone remains as evidence of the attachment.

Fig. 14.
FLINT KNIFE, attached to short wooden handle by bitumen.
(Cat. No. 14329, U. S. Nat. Mus. Southern Utah. Collected by Maj. J. W. Powell.)

The Museum possesses a specimen which has served as a knife, but without any handle being attached thereto; instead it is wrapped with a strip of otter skin. It is a large specimen, 7 inches long, 2½ wide, and one-half inch thick, and is leaf-shaped. It was collected by Capt. Philip H. Ray, U. S. Army, from the Natano band of Tinneh (?) Indians at Hupa Valley, California. It is of mottled obsidian, which is said to have come from Oregon. Captain Ray relates that these implements were held in great veneration by the old Indians, and that this had been used as a charm or talisman. In writing of the Hupas, Mr. Powers, in his "Tribes of California," says, page 79:

There are other articles paraded and worn in this and other ceremonial dances which they will on no account part with, at least to an American, though they sometimes manufacture them to order for one another. One of these is the flake or knife of obsidian or jasper. I have seen several which were 15 inches or more in length and about 2½ inches wide in the widest part. Pieces as large as these are carried aloft in the hands in the dance, wrapped with skin or cloth to prevent the rough edges from lacerating the hand, but the smaller ones are mounted on wooden handles and glued fast. The large ones can not be purchased at any price, but I procured some about 6 inches long at $2.50 apiece. These are not properly "knives," but jewelry for sacred purposes, passing current also as money.

LEAF-SHAPED IMPLEMENTS.

These, or similar implements, generally called leaf-shaped, have been found nearly all over the United States, many times deposited intentionally in nests or *caches*, sometimes to the number of a hundred or more, placed on end or on edge, and together as close as they can stand or lie. It is curious to note that in that portion of the United States east of the Rocky Mountains we are practically without information concerning their use or purpose, whether they were used as spear-heads or knives; whether they were objects of ceremony, as mentioned by Powers above, or whether they were intended for practical use. No one knows whether they were used naked in the hand or were attached to a handle. Dr. Metz and Professor Putnam discovered in 1884 in the Mariott Mound, No. 1, Little Miami Valley, ten points of deer antlers, which were grooved or chamfered, so that they might have served as handles for these leaf-shaped implements. But no leaf-shaped implements were found in connection therewith. Of the ten handles one had a piece of bone inserted for a cutting or piercing implement, and another a bit of worked flint, but it was triangular, and had no relation to the leaf-shaped implements, and was to be classed among the arrow-heads of common form.

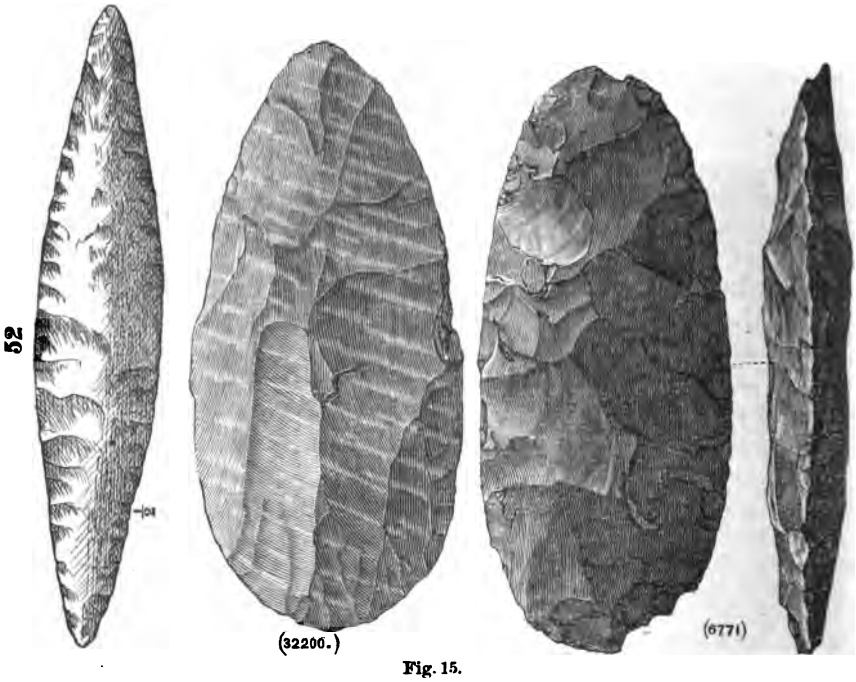

Fig. 15.
LEAF-SHAPED IMPLEMENTS.

These implements are found in plenty on the Pacific slope, but it is remarkable that in only two localities have they ever been found with their use indicated either by attachment to a handle or otherwise.

HANDLED KNIVES, FROM HUPA RESERVATION, CALIFORNIA.

FIGS. 75, 76, and 77. Hafted knives, of jasper; wooden handles attached with bitumen. (Cat. Nos. 126527-8-9, U. S. N. M.)

FIG. 78. Obsidian knife; wrapped around one end with a strip of otter skin. (Cat. No. 126530, U. S. N. M.)

FIG. 79. Elk-horn wedge. See Smithsonian Report, 1886, Part I, Ray collection. Plate XVIII.

In the Hupa Valley, northern California, the locality of the implement last described, we have seen it with a strip of otter skin for a handle (Pl. CII, Fig. 78), but others to the number of six or eight were also collected by Captain Ray, which were inserted in a broad wooden handle and fastened with bitumen (Pl. CII, Figs. 75, 76, 77). Some were leaf-shaped and some were with a tang; some were found with handle attached, while others bore the traces of bitumen, but were without a handle. The other locality is southern California in the region and islands about Santa

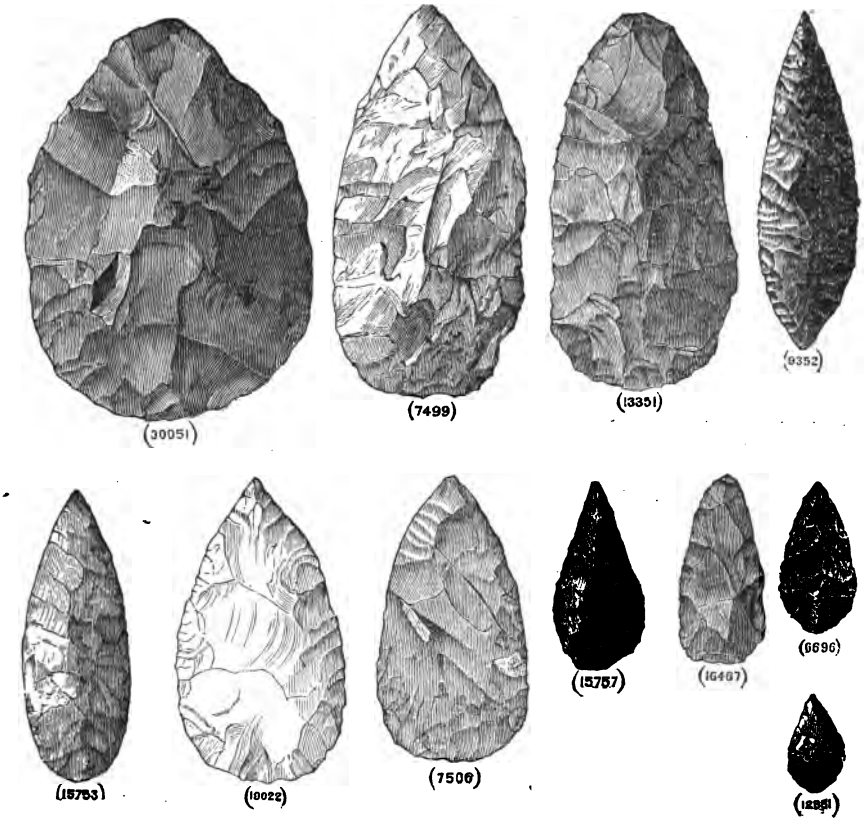

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FIG. 16.
LEAF-SHAPED IMPLEMENTS.

Barbara and the adjacent portions of Mexico. Here they have been found in burial places which appear to be, without doubt, prehistoric. The great archæologic interest of these leaf-shaped implements is that in Europe they belong to the paleolithic period, and are the type of the Solutréen epoch. They have been called in France *feuille de laurier*, laurel leaf. In America but a slight consideration has been given to them. They have always been considered as Indian, and the possibility of their belonging to the paleolithic period has never been contemplated.

It would become intensely interesting if, now that the attention of the public is directed to these implements, they should be found so associated with other paleolithic implements, or with the fauna, or under circumstances which would point to their belonging also to the paleolithic period.

NOTE.—Between the time of the preparation of this paper and the reading of its proof, I have prepared for the Museum, a classification of arrow or spear heads or knives, a short description of which is as follows:

LEAF-SHAPED.

Sub-class A: Thin and finely-shaped implements of the form of a laurel leaf; elliptical and pointed at both ends. They correspond substantially with the French Solutrian type of the paleolithic period of the stone age.

Sub-class B: These may be thicker and ruder than subclass A. Some are more oval, and the bases are not pointed, but are either straight or convex. The class includes the leaf-shaped argillite implements found by Dr. Abbott in the Delaware River gravels of Trenton, N. J.

Sub-class C: These are long, thin blades with nearly straight edges, more like a dagger or poignard. The base may be either convex, straight, or concave. Many of them show traces of attachment to a handle by means of bitumen or gum. They are peculiar to the Pacific Slope.

TRIANGULAR.

This class includes all forms approaching a triangle, whether the bases or edges be convex, straight, or concave. They are without stems, and consequently without shoulders, but in some specimens the concavity of the base produces barbs.

STEMMED.

This class includes all varieties of stems, whether straight, pointed, or expanding, and all varieties of bases and edges, whether convex, straight, or concave.

Sub-class A: Lozenge-shaped.

Sub-class B: Shouldered, but not barbed.

Sub-class C: Shouldered and barbed.

NOTE.—Nearly all of the convex bases are smooth, as though they had been worn. The purpose or cause of this is unknown.

PECULIAR FORMS.

These have such peculiarities as distinguish them from all other classes, but by reason of their restricted number or locality can scarcely form a class of themselves.

Sub-class A: Beveled edges. The bevel is usually in one direction.

Sub-class B: Serrated edges.

Sub-class C: Bifurcated stems.

SCRAPERS.

Thick flakes of flint, obsidian, etc. Worked at one extremity to a convex edge. They were inserted in a handle and used for scraping any needed substance, but principally for dressing skins. Nos. 38 and 41 are from Texas; 39, 40, and 319 from Ohio.

Occasional specimens are found shaped more or less like No. 40, with a tang and barb much resembling in that regard certain arrow or spear

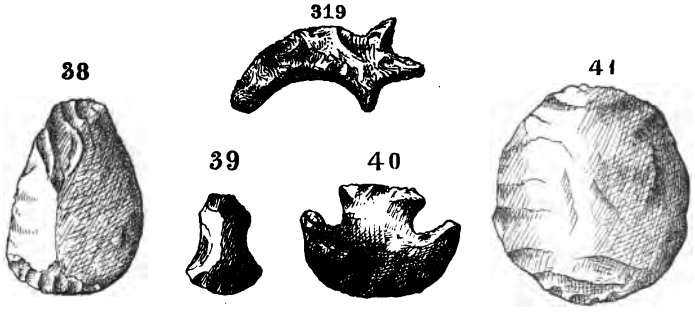

Fig. 17.
SCRAPERS.

heads, from a broken one of which it is supposed they have been made, thus serving a secondary purpose.

PERFORATORS.

They may have served to drill the harder substances, but also softer materials, as wood, hides, bone, etc. But slight traces of usage are found. Their form has given rise to the theory that they were drills or perforators, and they may have been so used, but it is by no means certain, and they may have had another origin or purpose. Old Indians have declared them to have been charms or fetiches.

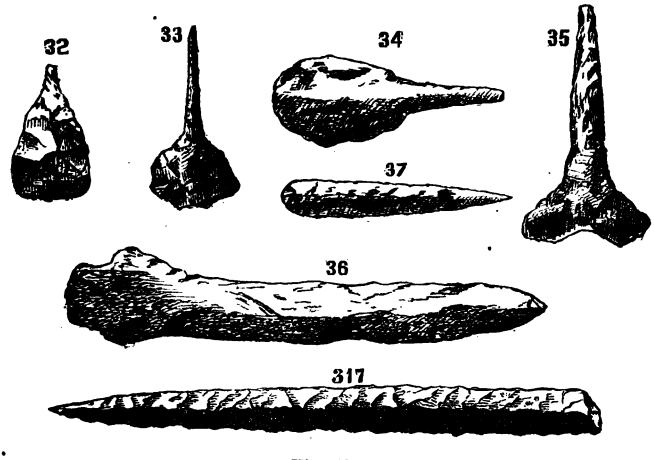

Fig. 18.
PERFORATORS.

Nos. 32, 35 are from Ohio; 33 from Oregon; 34 from Missouri; 36 from Tennessee, and 37 California. No. 7 is triangular, of brown flint from Santa Cruz Island, California.

HOES OR DIGGING TOOLS.

Dr. Rau describes these as "large, flat implements of siliceous material, usually ovoid in shape and sharp around the circumference. They are supposed to have been used as spades or hoes. The lower part is often smoothed by wear, appearing almost glazed." These are probably the largest style of chipped implements belonging to prehistoric times. The Museum possesses specimens 16 inches long, 6 wide, and 1 inch thick. I am not satisfied with the explanation of the smooth or

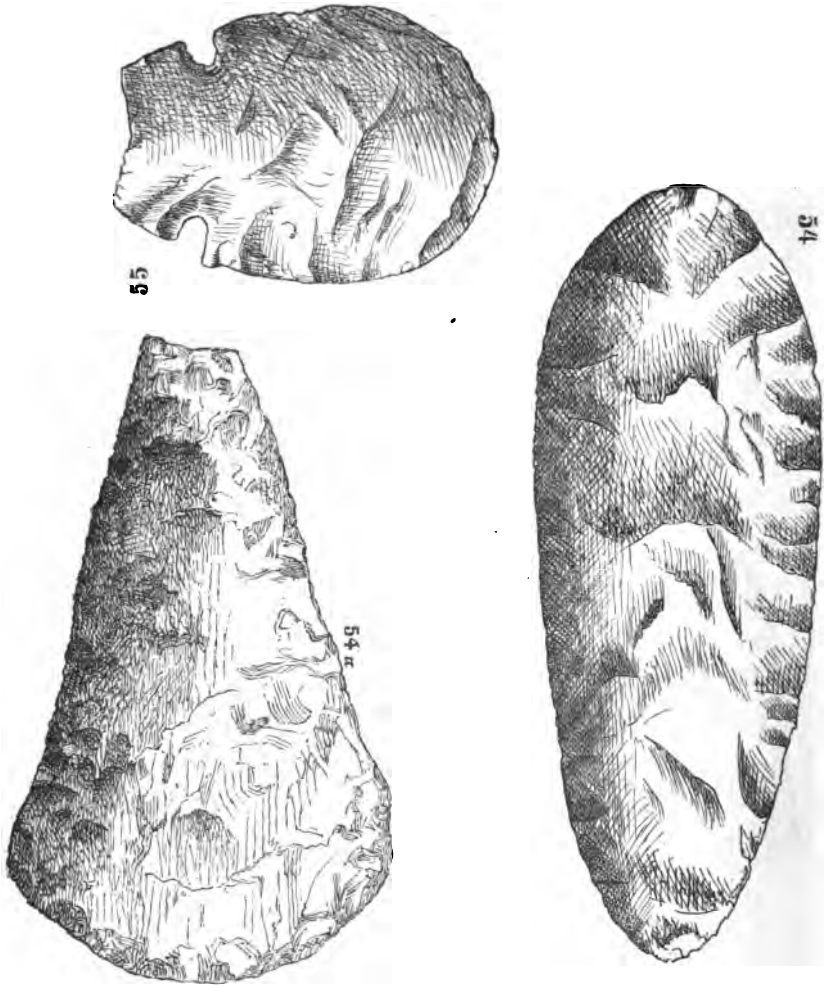

Fig. 19.
HOES, DIGGING TOOLS, OR AGRICULTURAL IMPLEMENTS (⅛).

polished appearance at the lower end. They may have been smoothed by use in digging, but many times the polish appears to be indicative of another origin.

No. 54 is from Tennessee; 54*a* and 55 are from Illinois.

POLISHED STONE HATCHETS.

These are sometimes called celts, from the Latin word chisel, but they are not chisels, but chopping tools used as axes or hatchets. The correctness of the Latin word has been assailed, and the name is being gradually abandoned. They have been also called in the United States (I think improperly) fleshers. They are the standard implement representing the neolithic period, or polished-stone age. They were often made of flint, but any hard, close-grained, and tough stone in the locality would serve. They are substantially the same in form, size, and, subject to the above suggestion, the same material in all parts of the world. A series of these implements from the United States will not differ essentially from a like series of any other country. They were used as a hatchet, being inserted in a handle of wood; occasionally in a socket of deer-horn, which, in its turn, was inserted in a wooden handle. Specimens made of hematite are, I believe, peculiar to the United States.

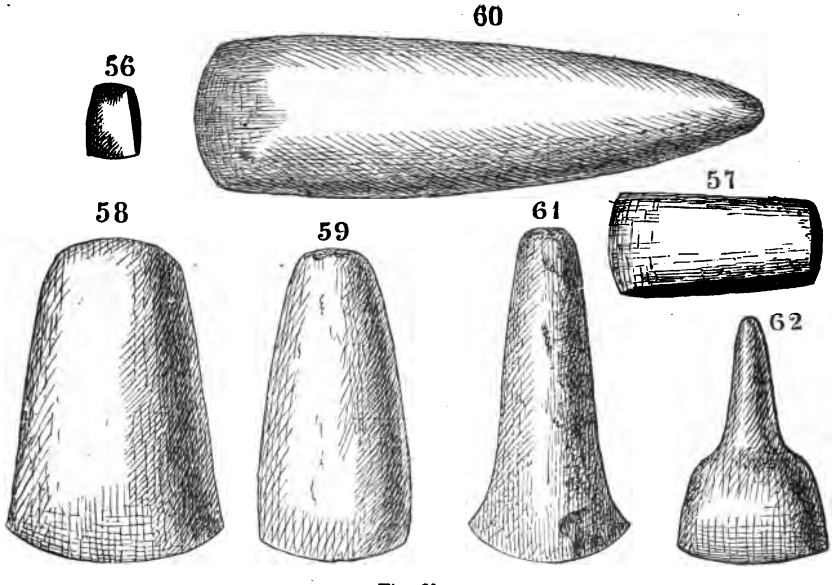

Fig. 20.
POLISHED STONE HATCHETS (¼).

No. 56 represents a hematite hatchet from Ohio; 57, greenstone from Indiana; 58, syenite from Illinois; 59, greenstone, and 60, indurated chlorite slate, from Tennessee; 61 from Louisiana; 62 rare, from North Carolina.

CHISELS, GOUGES, AND ADZES.

The chisels and gouges are similar to the polished stone hatchets just described, except the difference in form indicated by their name.

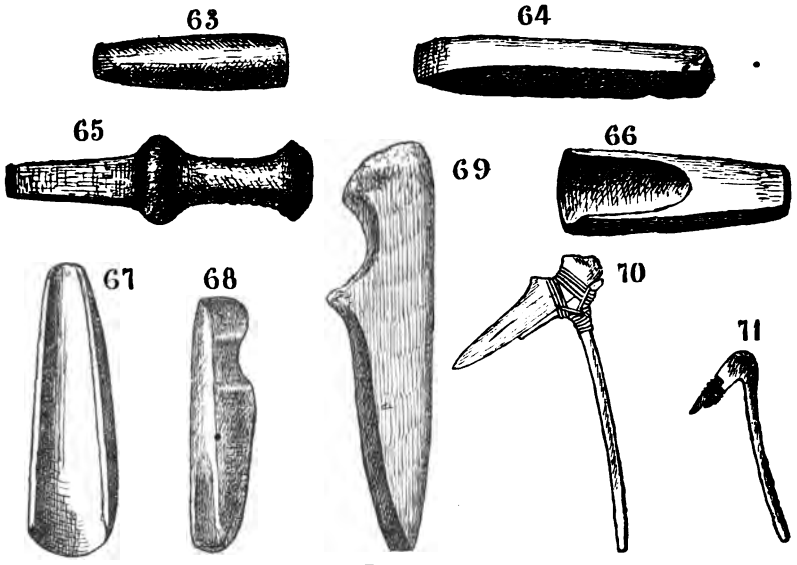

Fig. 21.

CHISELS AND GOUGES (principally from the Atlantic States). ADZES (from the northwest coast).

No. 63, diorite, from Ohio; 64, lydite, from Connecticut; 66, hornstone, from New York; 67, from Pennsylvania; 68, greenstone, from Massachusetts. Of the adzes 69, 70, and 71 are from the northwest coast.

GROOVED AXES, HAMMER HEADS, AND HAMMER STONES.

The grooved axes are peculiar to the United States. They are not found at all, or rarely, in European countries. They were used with a handle, which was attached by means of a withe or thong which passed around in the groove. They were of nearly all sizes, from 2 inches in length, weighing 3 or 4 ounces, to one in the Museum from Illinois 13 inches long, 7½ wide, and weighing 20½ pounds. The different styles are shown by the figures. No. 72, greenstone, is from Massachusetts. The average size and weight was from 5 to 7 inches in length and weight 1½ to 2 pounds. No. 73, greenstone, is from Arizona; 74, greenstone, is from South Carolina; 75 is from Wisconsin; 76, greentone, is from Alaska; 77, graywacke, is from Pennsylvania.

Hammer-stones.—The largest number of these are simply pebbles or broken stones which have been used by holding in the hand. Their broken and battered corners and edges, pecked and roughened by numberless strokes, are the only evidence of their use. Some large and

heavy specimens show a groove, as do the axes, which have served for the attachment of a handle. These are called mauls. No. 78, granite, Colorado, weighs 11 pounds. Many specimens which have been named hammer-stones are flat or oval pebbles, with an intentional worked de-

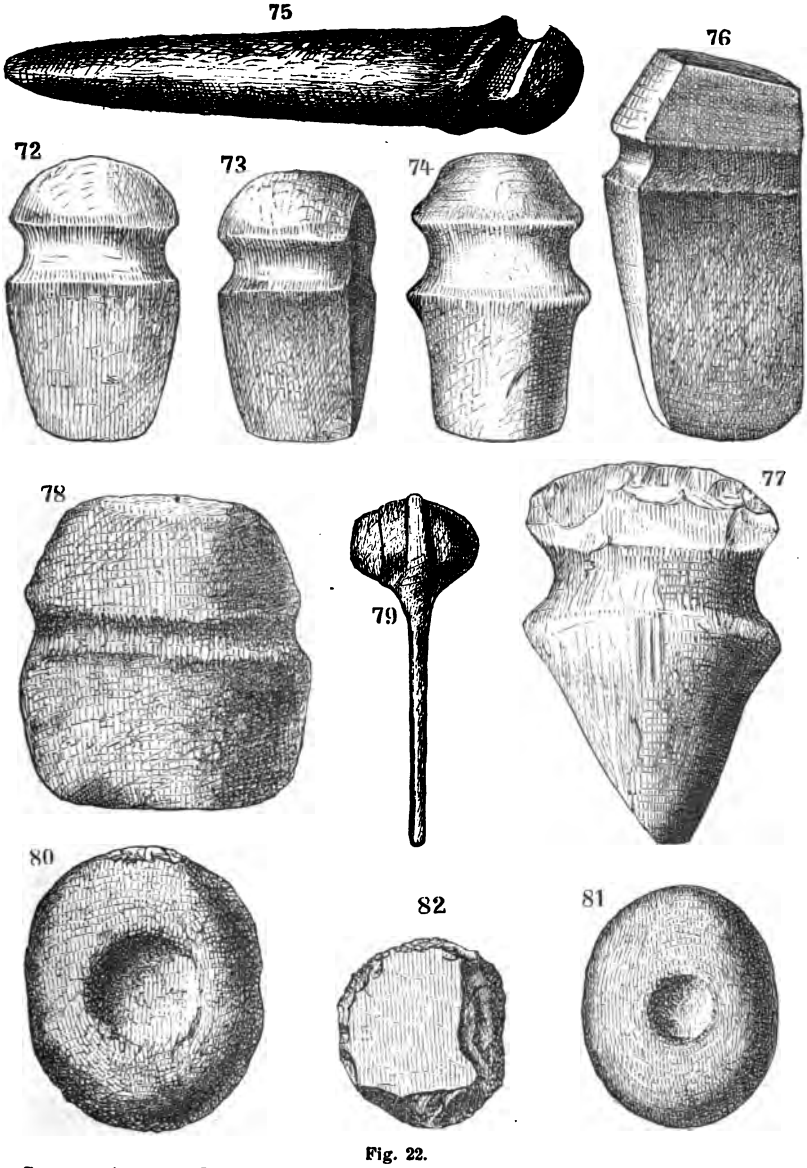

Fig. 22.
GROOVED AXES AND HAMMER STONES. (Nos. 72 to 77, ¼ size; Nos. 78, and 80 to 82, ⅛ size.)

pression in the center of sometimes one, sometimes both, sides. These implements have been found over a large portion of that world which belonged to prehistoric times. They are supposed to have been used

in the mines. This is practically the only grooved implement found in Europe. The Brothers Siret found similar implements in the mines of southeastern Spain. The British Museum has some specimens from the English mines.

No. 79 is a weapon or implement belonging to the modern Indians, a quartzite pebble weighing 2 pounds, incased in rawhide, which continues and is sewed around the withe which forms the handle.

ORNAMENTS, CEREMONIAL AND DECORATIVE OBJECTS, GAMING IMPLEMENTS.

There are a great number of objects widely different in form and material, but which, with all their differences, may be classed together. They have largely passed out of use by the modern Indians, and their

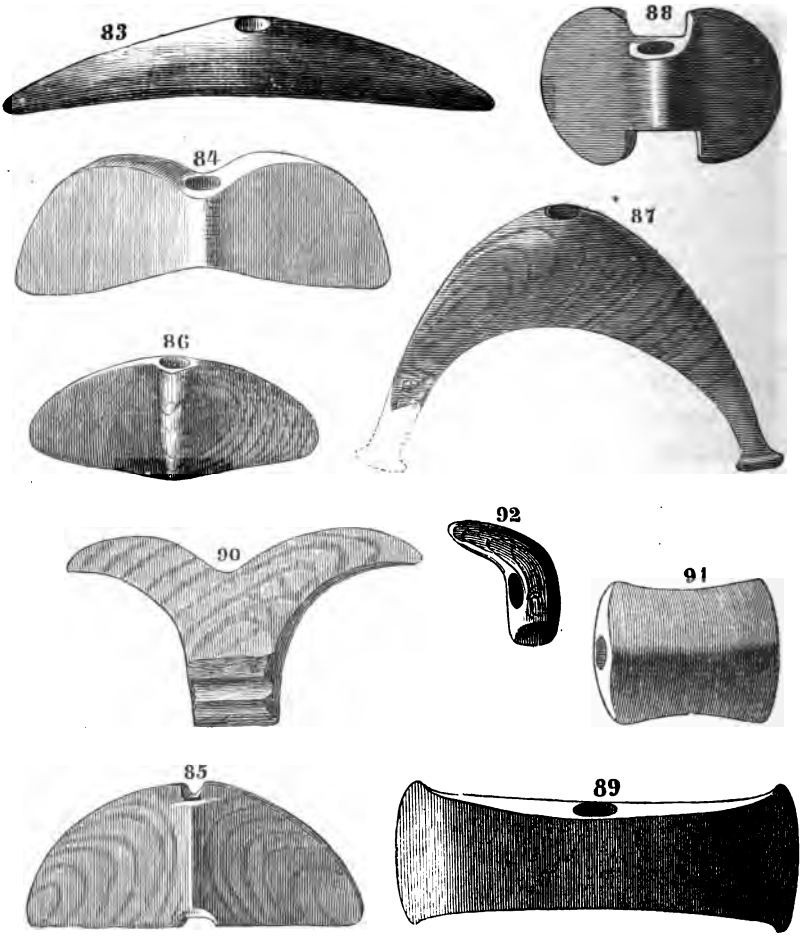

Fig. 23.

BANNER-STONES, OR DRILLED CEREMONIAL WEAPONS (½).

actual purpose is unknown. Divers names have been given to them, all of which have been based upon a theoretical idea of their purpose or because of their appearance. Some have been called banner-stones, some drilled ceremonial weapons, some pierced tablets, others gorgets, pendants, bird-shaped objects, boat-shaped objects, etc. The names thus given may or may not be correct, but are as good as others that have been suggested in their stead. They should be retained until something more correct can be given. They are all supposed to fall within the category given in the title above.

Banner-stones, or drilled ceremonial weapons.—These are for the most part symmetrically shaped and well polished. Their material is generally a soft kind of stone, principally slate, ofttimes banded. They are all drilled with a small hole. These holes have apparently never been used, for their edges (as well as the corners of the implements) are as fresh and sharp as the day they were made, showing no trace of usage. They have been drilled apparently with a hollow reed, and the annular striæ is frequently to be seen. Many specimens are found partly made, then broken and rejected. These show that they had been shaped approximately before the drilling commenced.

No. 84, of serpentine, is from Pennsylvania; 85, striped slate, from Wisconsin; 86, striped slate, from Indiana; 87, striped slate, from Pennsylvania; 90, striped slate, from Indiana; 92, striped slate, from Indidiana; 88, brown jasper, from Louisiana; 91, translucent ferruginous quartz, from Indiana.

Pierced tablets and boat-shaped articles.—These are mostly made of slate, the greenish striped variety having been preferred. The tablets are flat and thin; the holes may be drilled from one side or from both, and are accordingly of a conical or biconical shape. They bear no trace of usage. The same remarks apply to the boat-shaped articles, except as to the difference in shape.

No. 127, slate, from New York; 128, slate, from Pennsylvania; 129, from Louisiana; 130, 131, 132, slate, from Tennessee; 133, potstone, from Pennsylvania; 134, striped slate, from Ohio; 135, greenstone, from Kentucky.

Stone beads, pendants, and other ornaments.—Stone beads are found of different forms and material. No. 200 is serpentine, from Santa Barbara, California; Nos. 201 and 202 are of soapstone, from Pennsylvania; 204, catlinite, from New York; 203 is a straight tube nearly 3 inches in length, from Mississippi, beautifully drilled with a small hole its entire length. It is of a siliceous material resembling yellow jasper. A manufactory of beads of this material was discovered in Lawrence County, Miss., in the spring of 1876, and four hundred and forty-nine specimens were sent to the Museum by Mr. T. J. R. Keenan. An account of this find was given in Smithsonian Report for 1877, pages 293–298.

Another specimen, 211, striped slate, from a mound in Ohio, much larger and longer, not drilled lengthwise, but diagonally across the corners, may have served the same purpose of ornament, as likewise 212, which is of fine-grained argillaceous sandstone, from Kentucky.

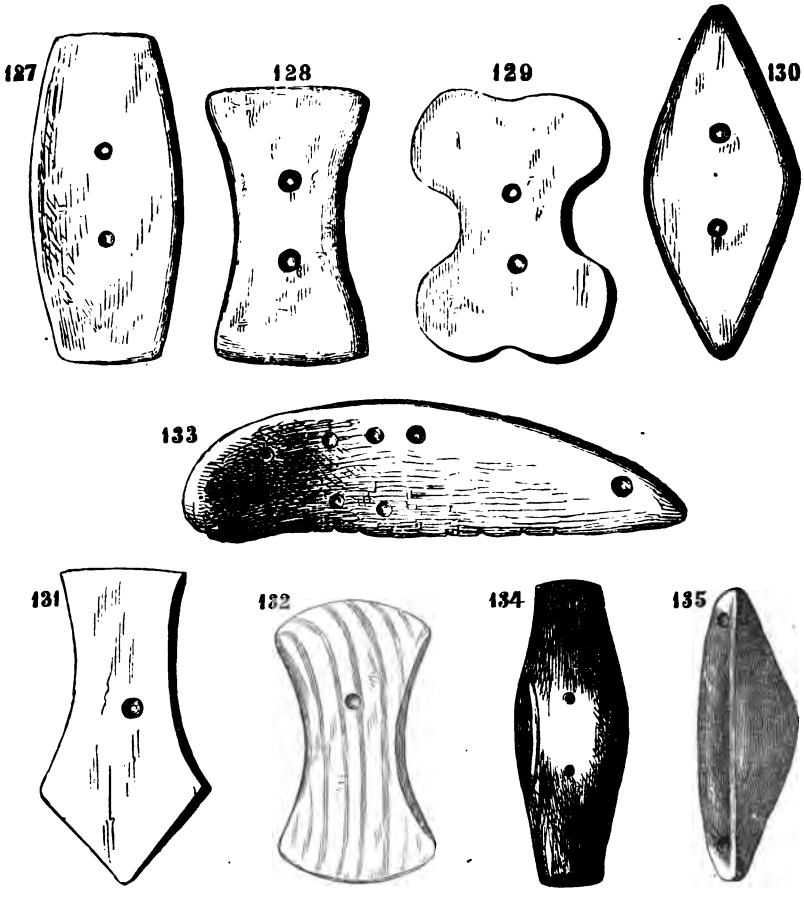

Fig. 24.

PIERCED TABLETS AND BOAT-SHAPED ARTICLES (½).

Pendants.—No. 205 is of trap rock; 206 a flat sandstone pebble, from Rhode Island; 207, same, from Pennsylvania; 208, same, Virginia; 209, argillaceous slate from a mound in Ohio, where it was found lying near the neck of a skeleton.

Bird-shaped objects.—Though this name has been given to numerous relics from their general resemblance to birds, their shapes are so various as to leave the design often uncertain. Some specimens more resemble the fence-lizard, and the eyes are frequently indicated by small, round protuberances. The objects are generally of soft stone, such as

the favorite green-striped slate; yet sometimes syenite and other hard substances have been employed.

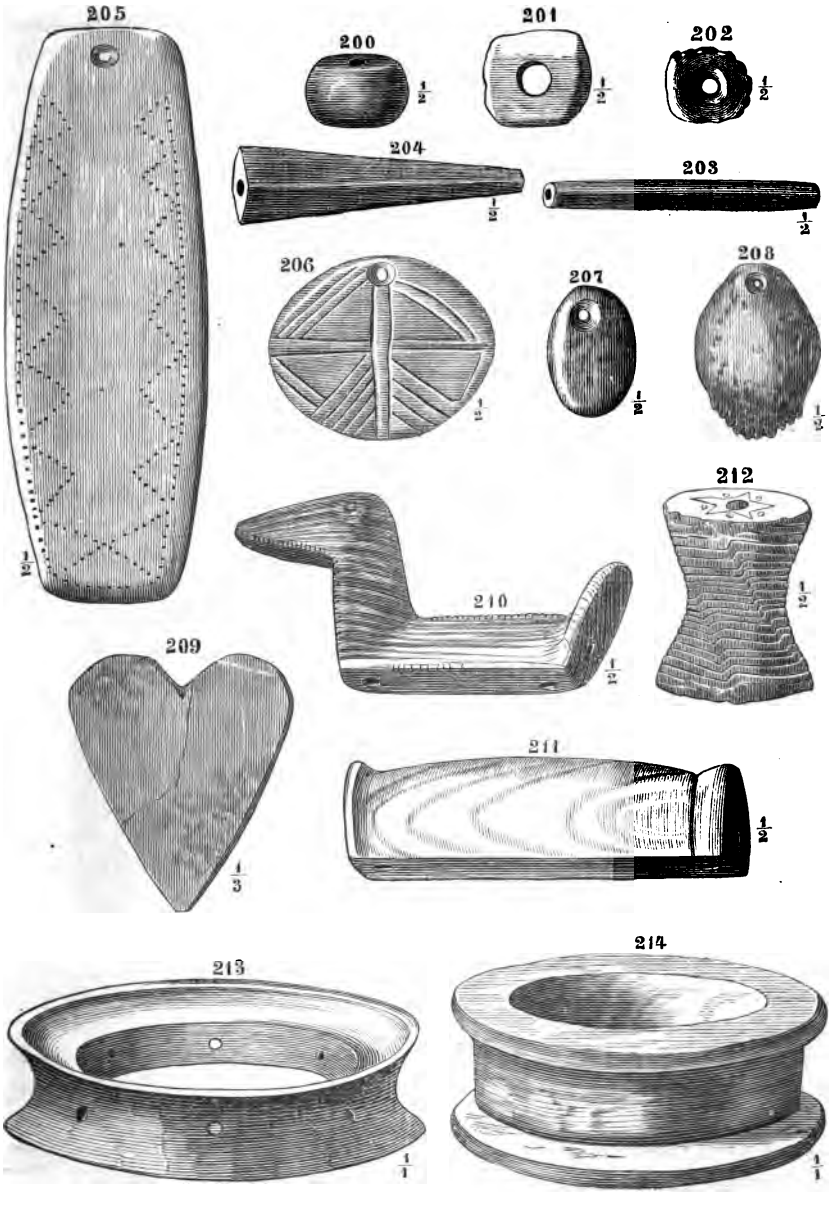

Fig. 25.

STONE BEADS, PENDANTS, AND OTHER ORNAMENTS.

No. 210 is striped slate from Pennsylvania. Small holes are drilled from the bottom and end, respectively, diagonally so as to meet and

form a continuous hole. The purpose of these have been for a long period unknown. A Chippewa Indian told me, in the Smithsonian Institution, last summer, that they served for gaming. They were placed in a pan or basket, which, being covered, was shaken and then set down quietly, the cover removed, and an inspection would show how many of the birds were seated upright. The player having the greatest number thus won the game.

Plummets and sinkers (Fig. 26).—These are analogous in name, and possibly sometimes in appearance, to the pendants just described; but an examination of the real object in the number as possessed by the Museum shows such differences as that they can not be classed together. Taking the last numbers on Fig. 26 for first description, Nos. 111 and 113 are of quartzite, from Pennsylvania; 112 is of graywacke, from New York. They are simply flat pebbles with notches chipped out on opposite sides to receive a cord or thong. Another variety, but of the same class, are pebbles more nearly round, which are still in their natural state, but have been grooved around the circumference. No. 104 is greenstone, from California; 107, granite, from Rhode Island; 108, soapstone, from Georgia; one with two grooves at right angles is 109, talcose slate, from Rhode Island; while No. 110 is sandstone, from Oregon, and is decorated with engraved lines. The latter may have served as an ornament. These specimens show a substantially different purpose from the gorgets or pendants (No. 205 *et seq.*), and it is alleged were used as plummets or sinkers, but on that opinions differ. No. 107 may possibly have been used with a handle and served as a weapon. The others, Nos. 100 to 105, are totally different from the pendants, and have been manufactured into their present state. They are of hard material, red or brown hematite, jasper quartz, greenstone, etc., and are made with grooves, knobs, or holes, apparently all for suspension. Their form would indicate them to be plummets. They much resemble the modern plummet, but their actual use is unknown. No. 100 is hornblende, from Ohio; 101, hematite, from Tennessee; 102 is from Arkansas; 103, greenstone, from Ohio; 105 is quartzite from Massachusetts; 106, greenstone, from Massachusetts. This class are supposed to have served as sinkers for the nets of prehistoric fishermen, but nothing more is known with certainty than is indicated by their appearance.

Discoidal stones (Fig. 27).—These are supposed to have been used for games among the Indians, probably in playing the game called "chungkee." It resembles the modern game of quoits, except that the stones are rolled on the ground instead of being pitched through the air. Some of these discoidal stones measure 6 inches and more in diameter with a regular dish-shaped cavity on each side. Their material is always hard and is often ferruginous quartz. They are carefully made, evidently with great labor; their outline is regular and true, and they have been rubbed and polished smooth.

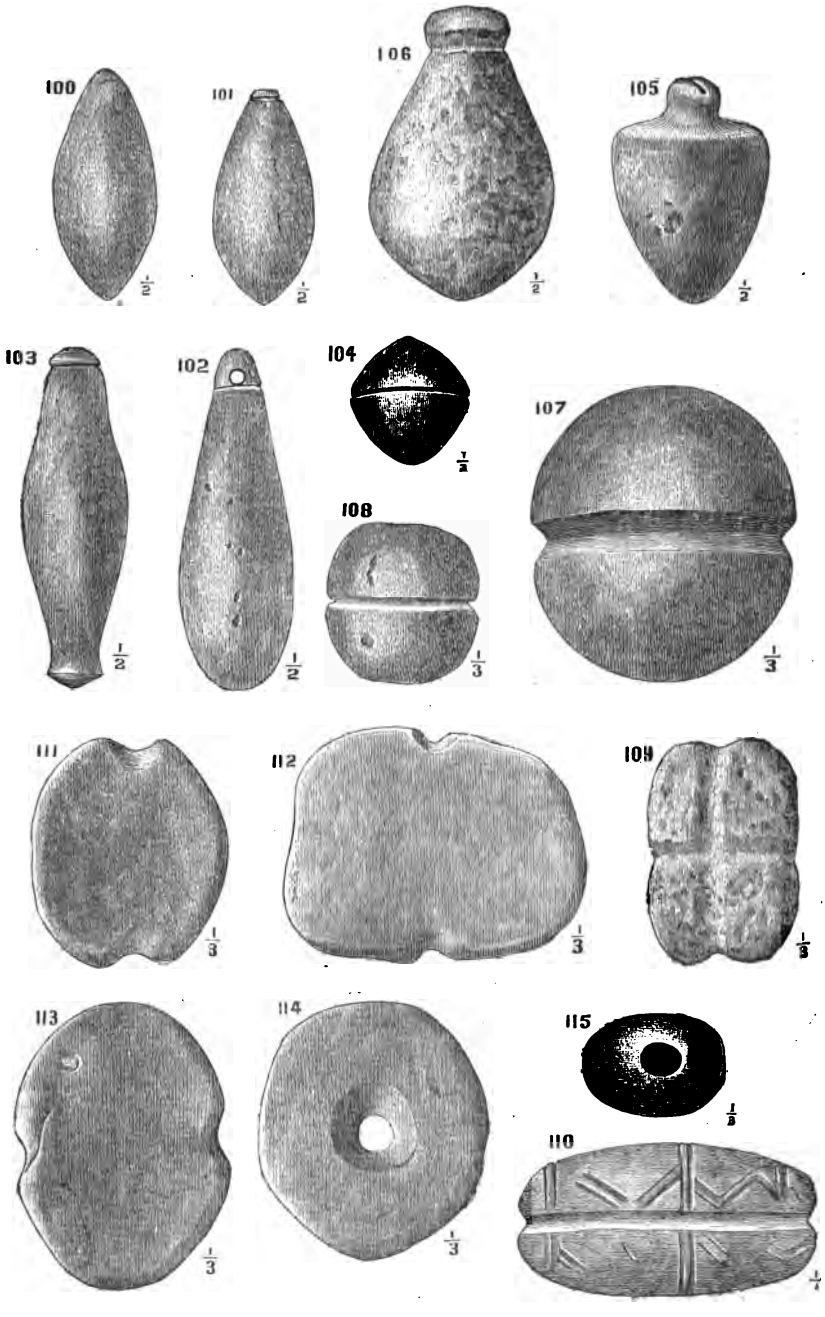

Fig. 26.
PLUMMETS AND SINKERS.

No. 116 is yellow-brown ferruginous quartz, from Tennessee; 117, brown ferruginous quartz, from Tennessee; 118, dark greenstone, from a mound in Illinois. In some specimens the cavities on the sides are carried deeper than in others, and their center marked by a perforation. Nos. 119 and 120 are quartzite, from Ohio. Other specimens are without the dish-like cavity. No. 121 is quartzite, from Georgia. Some specimens, similar in every other appearance, are diminutive, scarcely more than an inch in diameter. No. 122 is argillite, from Pennsylvania; and curious to remark, relics presenting the same appearance have been made of broken clay vessels, which, except the hole, resemble the spindlewhorl. The writer found a specimen of this kind in a prehistoric workshop in Brittany, France. It has been suggested that they were used as paint cups, and possibly this may be true.

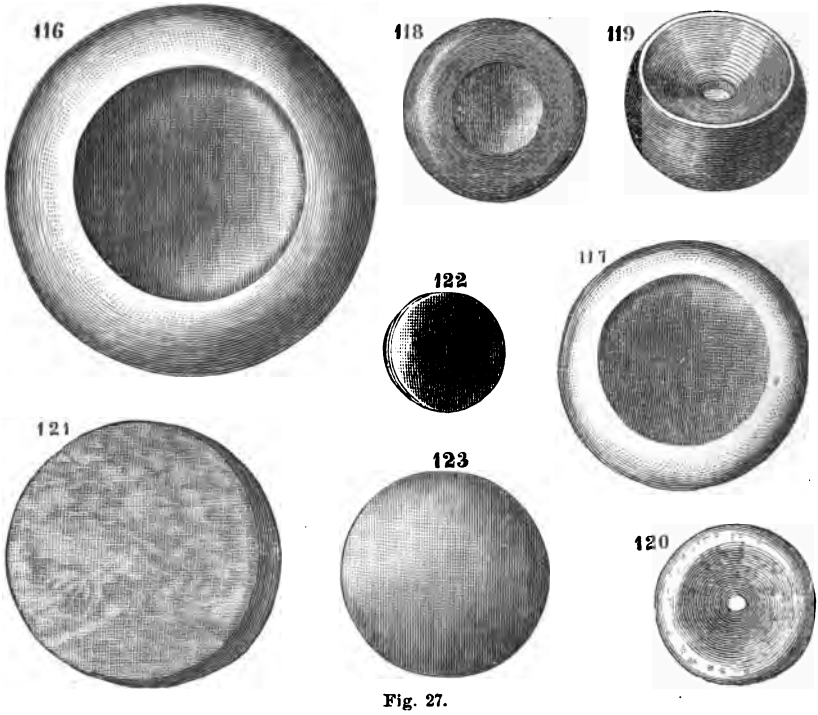

Fig. 27.
DISCOIDAL STONES (½).

When in Italy I remarked a game which had a great similarity to the chungkee of the Indians. In 1889 I wrote to my friend, R. Mancini, for a description, which he gave in the following:

LETTER FROM R. MANCINI, ORVIETO, ITALY, TO MR. WILSON.

* * * * * * *

The play, made by rolling discs at a mark, which you saw in one of the streets outside the city of Orvieto, has several names. It is called Ruzzola, or Ruzzoletta when played by the children with small discs; but if the play be by adults and with large discs it is called Ruzzolone, or sometimes Giuoco del Formaggio, or Play of the Cheese, because when played by the peasants or shepherds they use their discs of

cheese, betting one cheese against another. It is usually played by two persons, but may be by four. They divide themselves into opposite parties, and each one alternately throws the cheese or the disc, rolling it on its periphery at the distant mark or peg.

The discs are generally of hard wood. Sometimes the children, for economy, make them of terra-cotta, and also sometimes, but rarely, of stone. The small discs are from 7 to 12 centimeters in diameter, while the large ones are from 18 to 20 centimeters.

The following are the principal rules of the game:

Choice is made by "odd and even" as to which party shall have the first play. The line or point of departure is fixed by consent, and here the player stands to roll his disc. The goal or mark for its arrival is also fixed, and he whose discs rest nearest the mark or line is declared the victor.

This play dates from high antiquity, and is believed to be the modern repetition of the ancient classic game made known generally by the antique statue of Discobolus.

In excavating the ancient tombs I have found terra-cotta discs placed as covers for amphora in crematory burials, but which appeared to have been first used as discobolo.

Perforated stones—club-heads or riatta.—The discoidal stones of the perforated kind pass by degrees into the ring form, a type exemplified

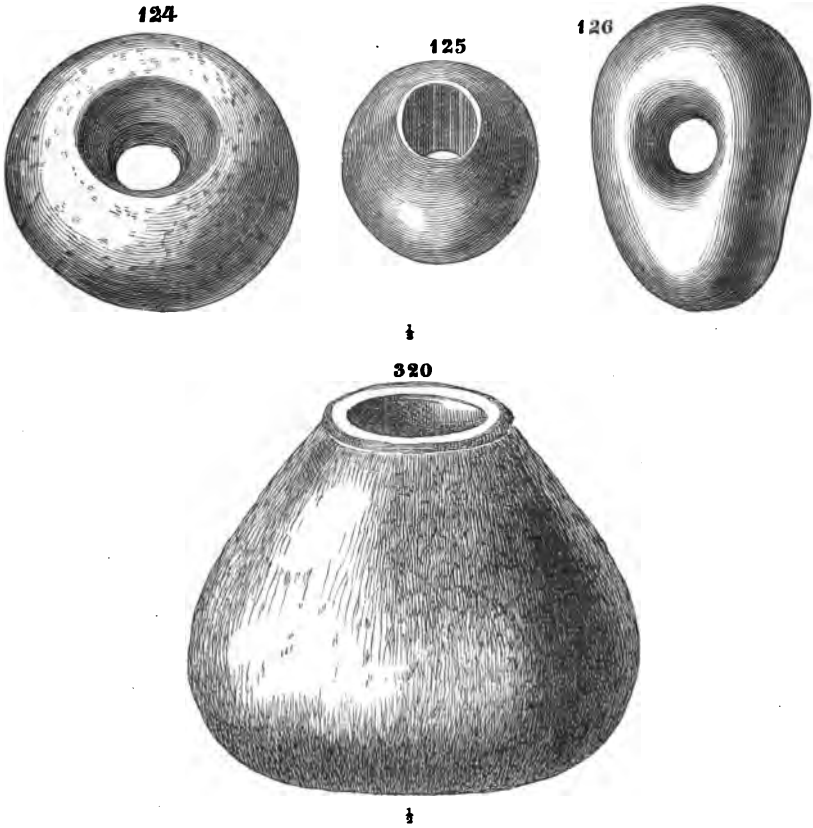

Fig. 28.

PERFORATED STONES—CLUB-HEADS OR RIATTA.

by a large number of specimens from southern California. Their material is sandstone, serpentine, soapstone, etc., though occasional specimens have appeared of a harder material like greenstone. They vary much in size and character. They are from 1½ inches in diameter to 5 inches and more. Some are only half an inch in thickness, while others are so thick as to equal their diameter, almost forming a globe. Some are pear-shaped; others, with the globular form like No. 125, have their holes drilled the same size all through. They are occasionally decorated, and may have served as heads for a club or staff. Specimens with a staff 5 feet long have been found in California and Mexico, and also in New Zealand.

No. 124 is hornblende, from Santa Catalina Island; 125 greenstone, and 126 serpentine, from Santa Rosa Island, California.

Evidences of usage are to be seen in specimens resembling 124, 126, and similar objects are used in Mexico called riattas. A lariat is passed through the hole in the stone and stretched, and is polished and smoothed by the stone rubbing back and forth.

CUTTING-TOOLS, SCRAPER AND SPADE-LIKE IMPLEMENTS.

Cutting tools.—No. 93 is of black slate, from Pennsylvania; 94, hard red shale, from Pennsylvania; 95, from Indiana. Implements similar to these are used on the northwest coast for opening fish. (Fig. 29.)

Scraper and spade-like implements.—These have been classed as axes, but an examination shows them more likely to have served as scrapers or spades. They are of large size, hard material, and scarcely enough examples have been found to establish them as a class. They are possibly abnormal specimens. No. 96 is greenstone, from Kentucky; 97, from Arkansas; 98 and 99, from South Carolina.

STONE VESSELS FOR CARRYING OR HOLDING LIQUIDS—COOKING AND GRINDING UTENSILS.

Vessels like a pot or platter were made and used by the aborigines. East of the Rocky Mountains they were made of soapstone; while on the western side the material used was much harder. Soapstone quarries have been found in many parts of the United States where these utensils had been manufactured by the prehistoric man. Uncompleted vessels and these in fragments are frequently found. They were many times made of a size and depth sufficient to hold, and if need be cook, liquids. (Figs. 30, 31, 32, 33.)

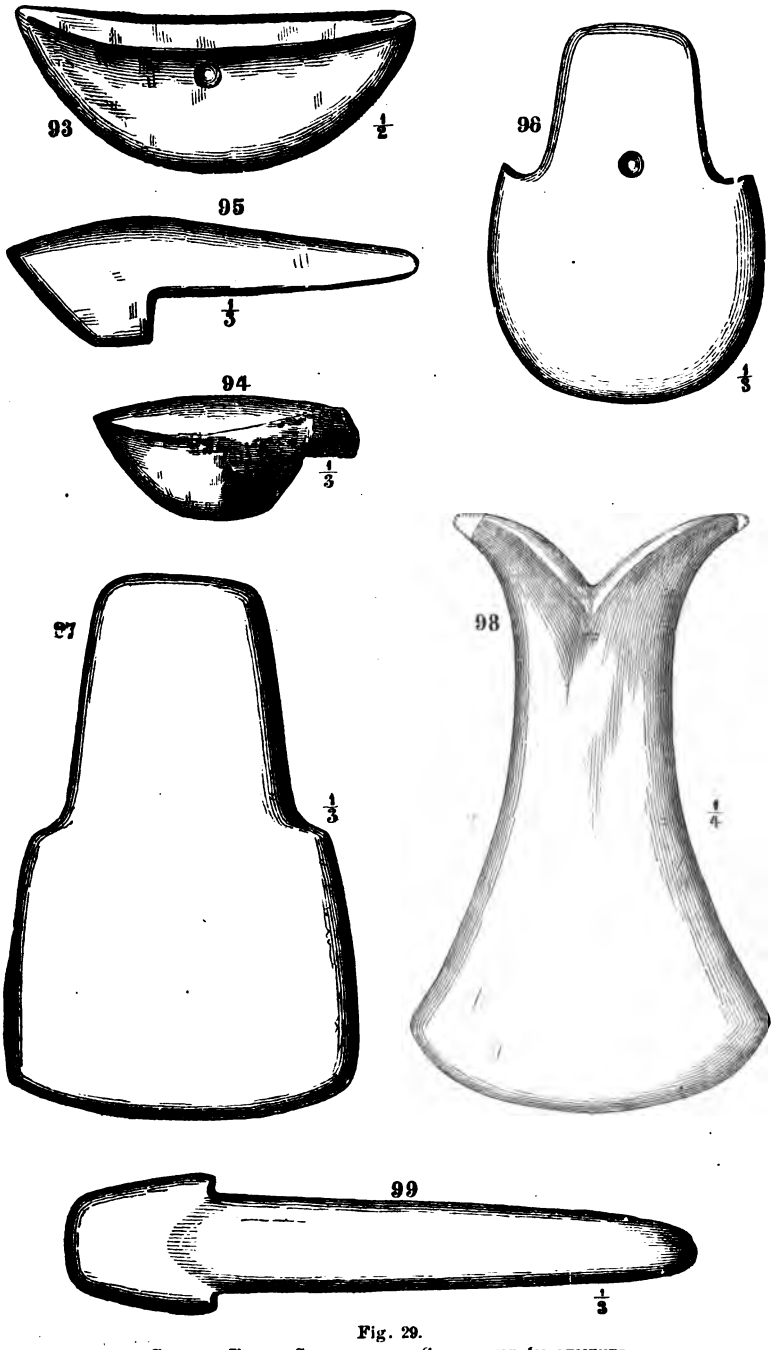

Fig. 29.
CUTTING TOOLS, SCRAPER, AND SPADE-LIKE IMPLEMENTS.

Others were in the shape of plates, and as such could be used to fry and broil.

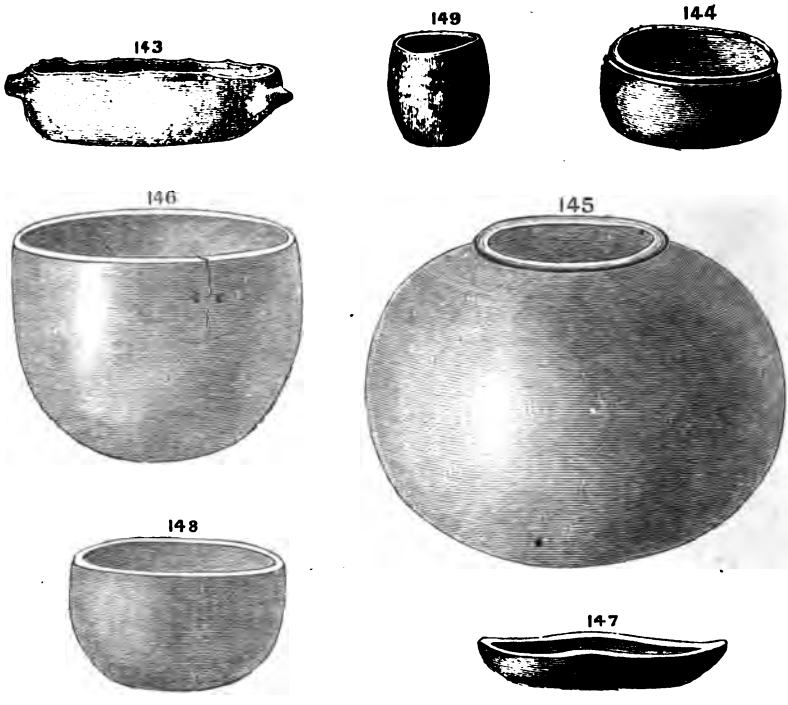

Fig. 30.
STONE VESSELS (¼).

Nos. 150 and 151 are of graywacke from a mound in Alabama; 152 is of soapstone, from Santa Cruz Island, California.

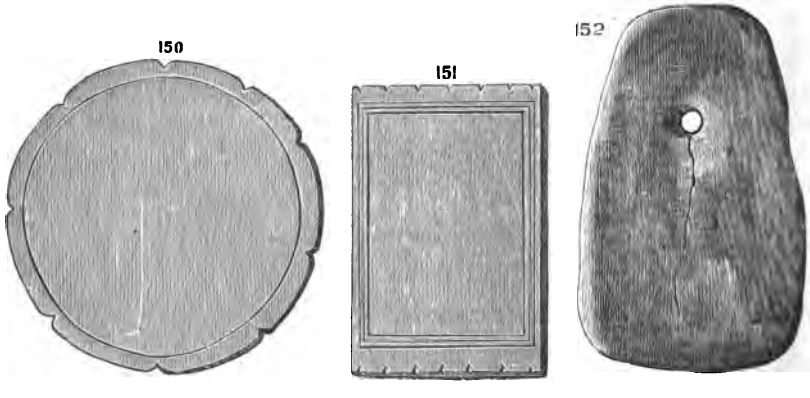

Fig. 31.
STONE PLATES OR PLATTERS (¼).

Mortars are of varying dimensions and shapes. The best specimens come from California. Nos. 153, 154, and 155 are all from San Nicolas Island, California; 156, Dos Pueblos, and 157, from Santa Cruz Island, California. Nos. 158 and 159 are stone slabs used for grinding (the process being indicated in the figure) after the fashion of the Mexican Indian metate. They are from Utah and New Mexico.

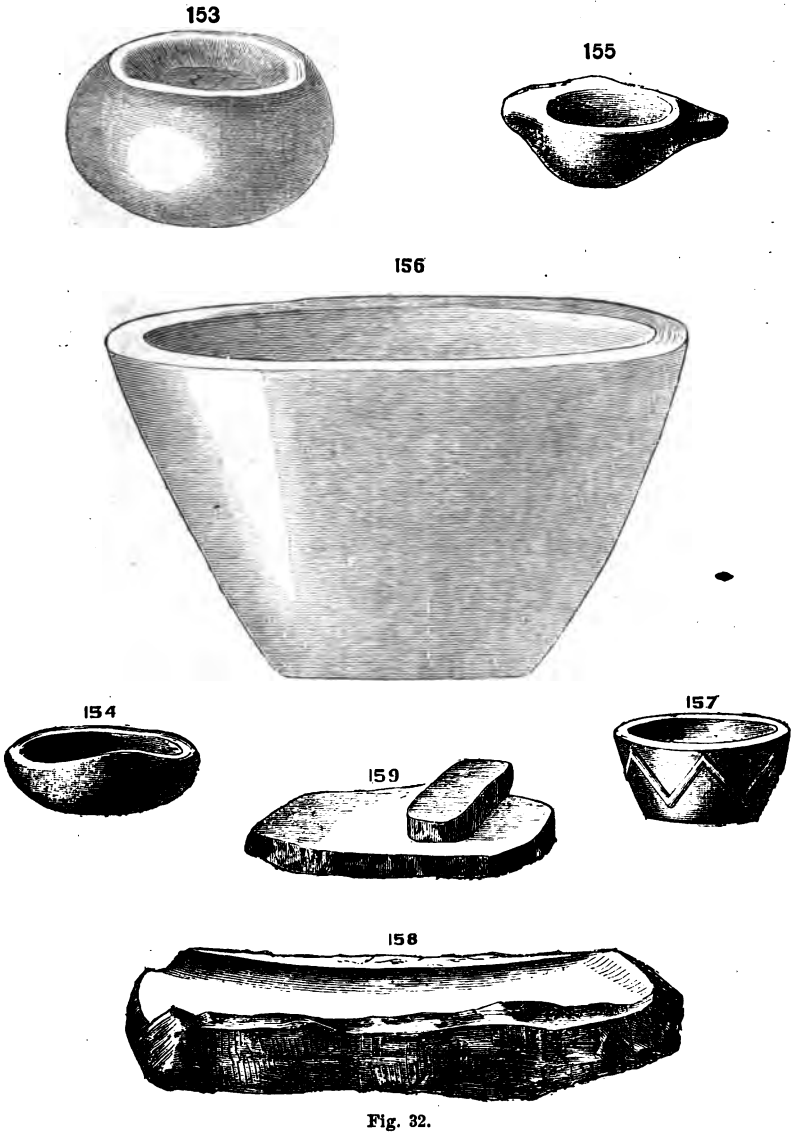

Fig. 32.
MORTARS.

A mortar without a pestle would be of but slight use. Many specimens are found. While the greater proportion of those in the Museum

come from the Pacific coast, yet the Eastern States are by no means unrepresented.

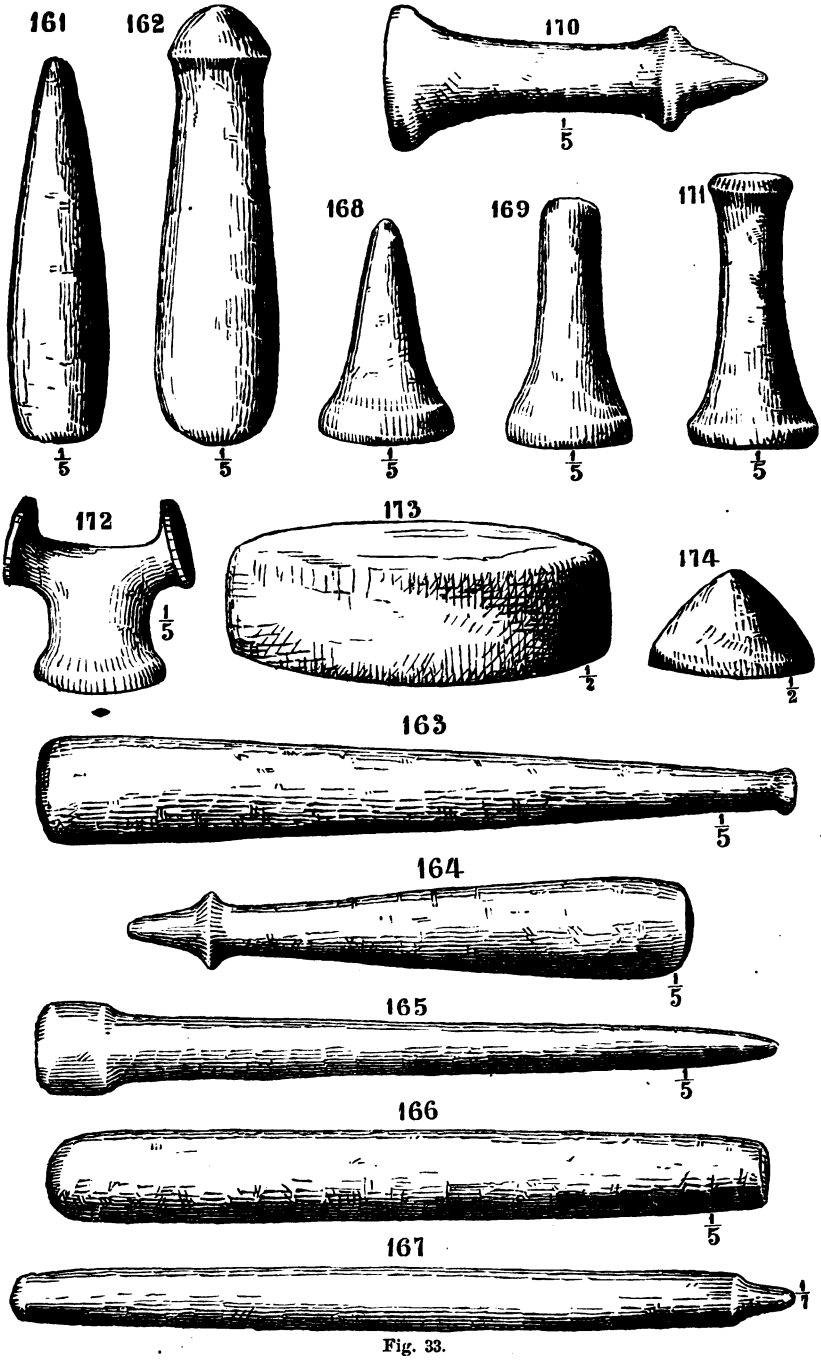

Fig. 33.
PESTLES AND HAMMERS (principally from California).

No. 161 is of syenite; 162, 163, 164, 165 are from California; 166 is fine-grained sandstone, from Rhode Island; 168, greenstone, from Pennsylvania; 169, syenite, from Ohio; 167 is from Alaska, 2 feet 5 inches long, of greenstone. Nos. 171 and 172, from the Pacific coast, are labeled as hammers with which to drive wedges to split wood. Dr. Rau says:

There is a class of small conoid-shaped mullers made of hematite, which may have been used for rubbing paints (No. 174, greenstone, Ohio).

ROCK SCULPTURES OR PICTOGRAPHS.

These represent sometimes human, sometimes animal, forms, and sometimes forms which can not be identified. They may have been made by scratching, pecking, or cutting. Occasionally they are colored. The figures are often large and complicated, and could only have been produced by long-continued labor, which, from their position (many times on naked rocks, high up on a precipice), was not unaccompanied by danger. Their position should be noted by the observer; when possible, sketches should be made and the discovery reported to the Smithsonian Institution.

Cup-stones. These are small cavities wrought by pecking in the surface, sometimes of the solid rock, and again in bowlders and pebbles.

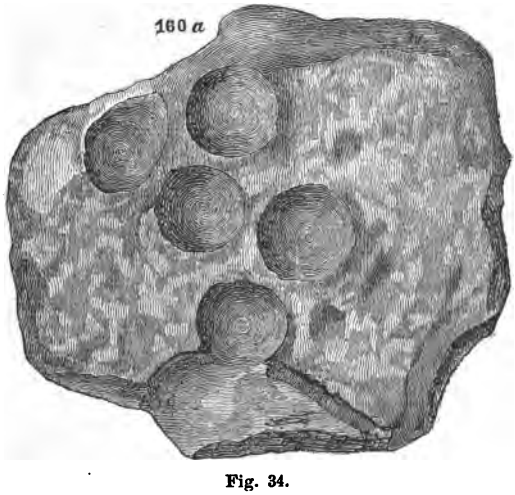

Fig. 34.
CUP-STONE.

They, like the rock-sculpturing, are distributed almost over the entire globe, and have been found in regular lines or diagrams high up on the face of the rocks in the Himalaya Mountains. They have been found on large bowlders among the Alps and all over Europe; also on the stones composing the megalithic monuments of prehistoric man, where the cavities are often polished smooth. They are numerous in Scotland and England on pebbles or small bowlders, and equally so in

the United States. They are found in abundance in Ohio. Their use or purpose is entirely unknown. The subject forms an interesting study. Dr. Rau published an interesting monograph thereon, entitled, "Observations on Cup-shaped and other Lapidarian Sculptures," contributions to North American Ethnology, vol. v, etc. He inclines to give them a religious rather than a utilitarian character.

PIPES AND SMOKING TUBES.

No class of aboriginal productions of art exhibit a greater diversity of form than do the pipes of the prehistoric man of North America.

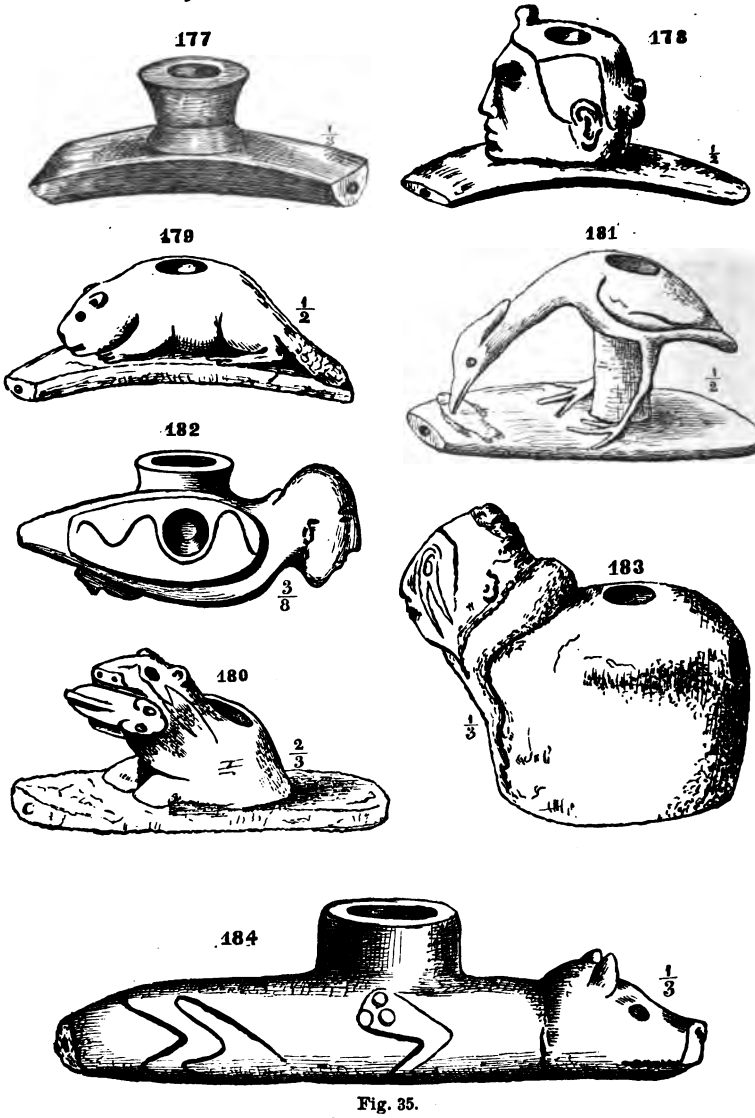

Fig. 35.
STONE PIPES.

They are chiefly carved from stone, but not unfrequently were molded in clay.

Messrs. Squier and Davis, in their explorations of mounds in Ohio, discovered many curious and interesting types. They were supposed at one time to have been made of hard stone, a kind of porphyry, but later examinations and scientific analyses have shown them to be of softer materials, composed of slaty and calcareous minerals.

Nos. 177 to 184 represent types of those found by Squier and Davis.

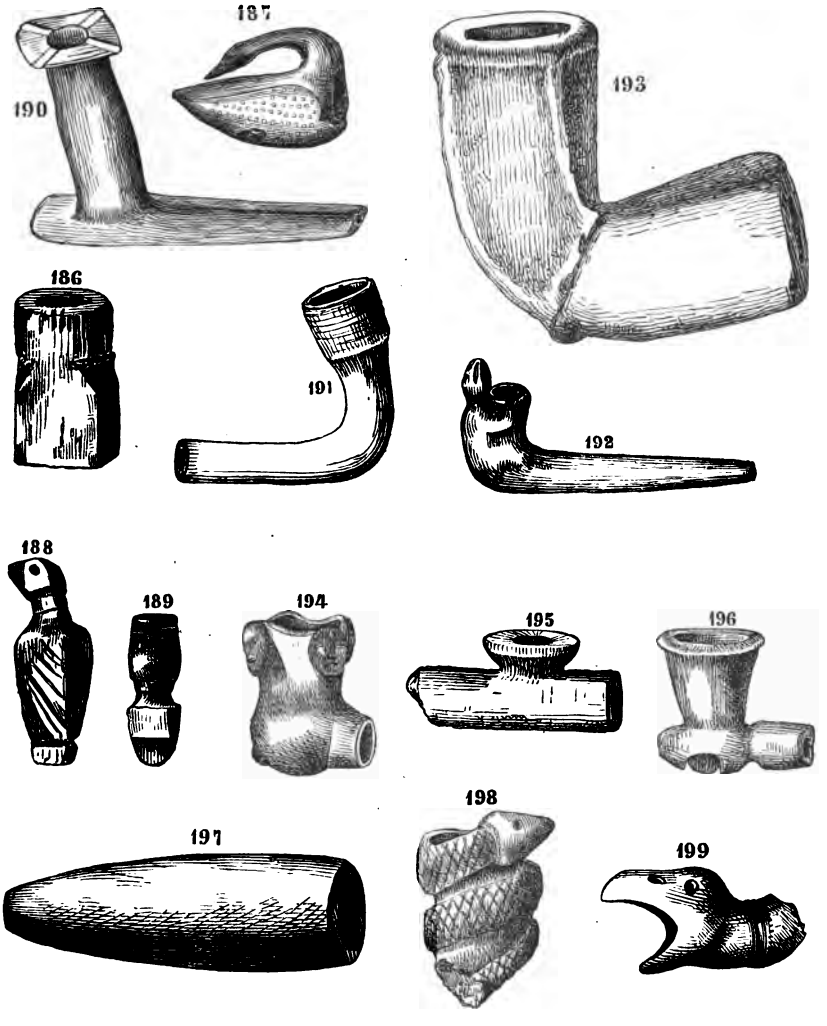

Fig. 36.
Pipes.

No. 186, argillaceous stone, from Pennsylvania; 187 represents a loon, and is of serpentine, from West Virginia; 188, from New York; 189,

from Ohio; 190, from Virginia; 191, serpentine, from New York; 192, steatite, from Pennsylvania, highly polished, representing a lizard; 193, soapstone, from North Carolina; 194 is from Texas; 195 from a mound in Kentucky. The latter is of compact limestone, and evidently of high antiquity. Its form is somewhat peculiar, in that it is the favorite among those who manufactured pipes from the catlinite or red pipestone, and has been continued into recent times. No. 196 is from Georgia; Nos. 198, 199 are made of clay, and were both found in Madison County, New York.

Stone pipes of entirely different character are found in California. They are represented by No. 197, of serpentine, from Santa Barbara County. These were in the form of tubes of various sizes and lengths, some of which are very large. Specimens have been found with a piece of bone inserted in the tapering end and cemented with bitumen for use as a mouth-piece, after the fashion in amber at the present day.

Allied in appearance to the California pipes are tubes which may have served as pipes, though neither in the instrument nor in the hole drilled therein is there apparently any provision for insertion in the mouth. The hole through the tube is sometimes biconical, having been drilled from both ends, and is smaller in the center, but quite too large at either end for the mouth. It has been suggested that these wide-mouthed pipes might have had two reeds inserted, which, being cemented with bitumen, were smoked through the nose. The smoke would thus be inhaled into the lungs, and so have a more powerful intoxicating effect. This, if true, might account for the small size of the bowl in many Indian pipes, a smaller quantity of tobacco being required in this than in the usual mode of smoking.

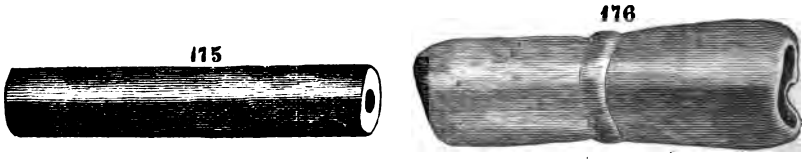

Fig. 37.
TUBES (½).

The material was soapstone, slate, and chlorite. Nos. 175 and 176 are from Tennessee.

The name "calumet pipes" has been given to those of large size smoked with a stem and representing usually a bird, animal, and sometimes a human figure. They are thus called by the Indians on account of their bulk and their use on occasions of great ceremony.

No. 185 is one of the finest possessed by the Museum, and is from Kentucky.

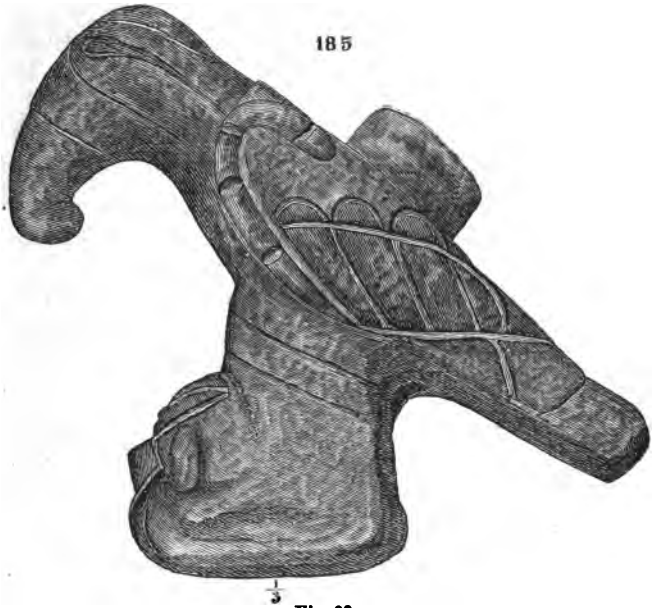

Fig. 38.

CALUMET PIPE.

(Cat. No. 16697, U. S. N. M. Received from the Kentucky University.)

BONE IMPLEMENTS.

The adoption of bone instead of stone for the implements of the prehistoric man differed widely in different countries. It is difficult to give satisfactory reasons therefor. It has been said that bone implements were not made in the United States, because the stone was so easily obtained. But in France, where bone implements are in greatest profusion, the flint suitable for chipping, and of which the finest implements could be and were made, was to be found, and is still very abundant. Bone, horn, and ivory were used indiscriminately, and served according to the need, as perforators, points, harpoons, fish-hooks, etc, They were often drilled, and so formed objects of suspension, ornaments, etc. Hollow bones might serve as tubes. They might be also sawed to serve as rings or beads of varying size and length. One of the most interesting varieties of implements in bone are those found almost only at the prehistoric cemetery at Madisonville, Ohio, by Dr. Metz and Mr. Low. Any discoveries made, information obtained, or specimens found of scientific interest should be reported. (Fig. 39.)

COPPER IMPLEMENTS AND ORNAMENTS.

Implements and ornaments of this metal are shown in figure 40. They need not be described; their appearance will be sufficient. The remarks concerning the fraudulent character of some specimens sought to be foisted upon museums and collectors, and the necessity for the greatest care concerning the preservation of proofs and of genuineness, apply with even greater force to copper implements than to those of stone.

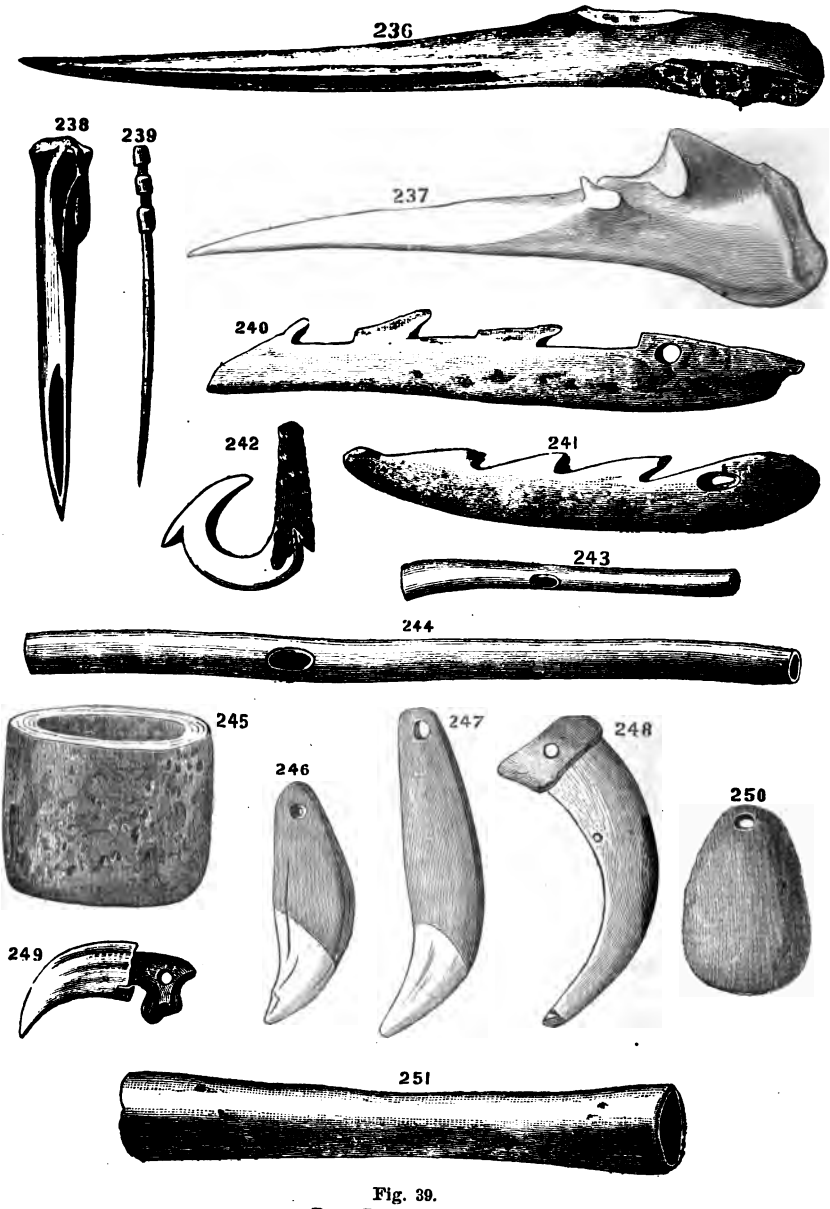

Fig. 39.
BONE IMPLEMENTS (½).

Fig. 40.
COPPER IMPLEMENTS AND ORNAMENTS FROM THE UNITED STATES.

HUMAN REPRESENTATIONS.

Occasionally, though rarely, specimens of sculpture representing the human face or figure have been found in the United States. Those represented in the cuts are mostly from Mexico, but they will serve as illustrations. In consequence of their rarity and the superior art displayed, they have been much sought, and these with representations of

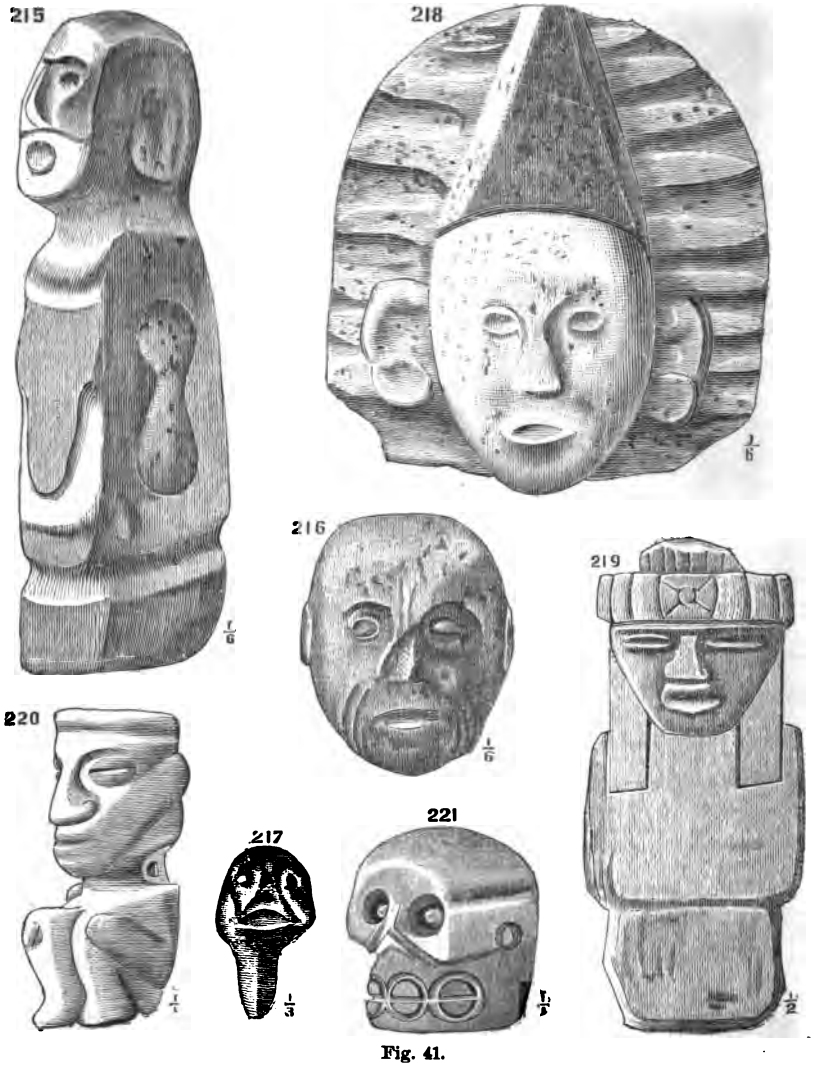

Fig. 41.
HUMAN REPRESENTATIONS.

animals have been subjects of fraudulent manufacture. The fortunate finder of such a specimen should take every means possible, by the calling of witnesses, identification of the precise locality, the preservation, if possible, of the matrix or bed in which it is found, and by any other means, to preserve the evidences of its authenticity and genuineness.

SHELL IMPLEMENTS AND ORNAMENTS.

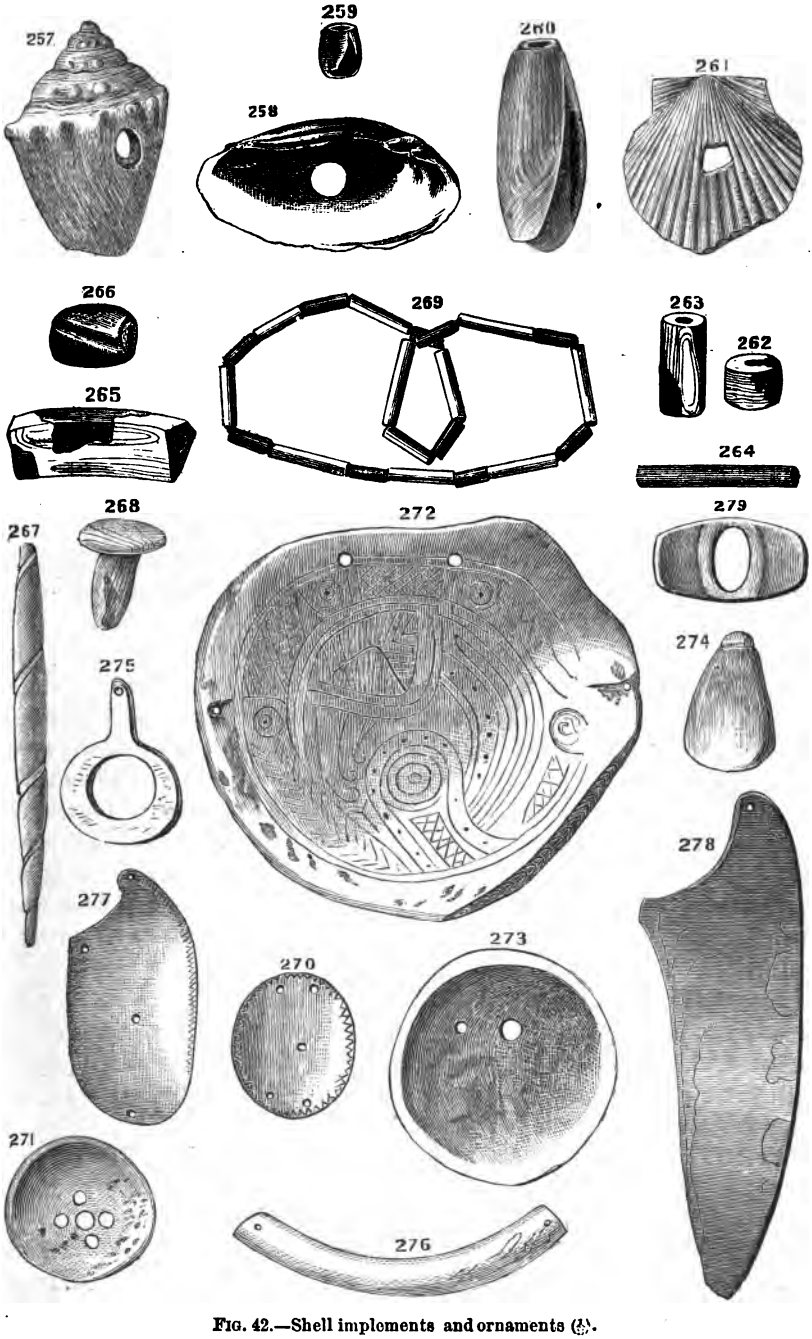

FIG. 42.—Shell implements and ornaments (⅓).

The various shells of the rivers and ocean furnished a material of great value to prehistoric man, and one which he could without much labor apply to a variety of uses. Small shells were perforated and used as beads; others were cut from the clam and mussel shells, which furnished the wampum. The haliotis was ground from the back and center so as to form bracelets. The same ornament made in the same way has been found in great numbers by the brothers Siret in their late discovery in southeastern Spain. The most interesting, as well as artistic, of the ornaments made from shell are the gorgets, which are especially noticeable for their engravings. They are sometimes cut so as to represent, upon the outside, a human face, but many have been found beautifully engraved in elaborate designs much resembling the mythologic art of Mexico and Central America. No. 272, found in Tennessee, represents one of these.

POTTERY.

The prehistoric pottery of Mexico and Central America forms a special group; that from the Pueblos of Arizona and New Mexico, another; while that made by the North American Indian constitutes a third group. Each of these has distinctive characteristics.

The pottery of the North American Indian is in some respects like the dolmen pottery of Europe, although it differs in many details of form, mode of manufacture and ornamentation. The North American Indian used neither wheel nor furnace, nor did he, except rarely, decorate it with colors. The clay was frequently mixed with pounded shells. The decoration of pottery made in the eastern portion of the United States was effected by incised lines and dots, with various combinations. The spiral and volute were employed. Among the Southern Indians much of the decoration was made by the impress of textile fabrics, sometimes with only a string or cord. In the interior, and principally on the Mississippi River, the pottery vessels were made to represent sometimes the human form, sometimes animals. There was a much greater prevalence of the bottle-form in the United States than in Europe.

Prof. W. H. Holmes, of the Bureau of Ethnology, has written an interesting monograph upon aboriginal pottery in the United States, and the late Col. James Stevenson described the Zuni and Pueblo pottery. Both these papers have been published in the Reports of the Bureau of Ethnology, and are profusely and elegantly illustrated.

The following are given as specimens of what may be found in mounds:

No. 280 is from a mound in Tennessee; 281 from a mound in Illinois; 282 from a mound in Union County, Kentucky; 283 a mound in Tennessee; 284 a mound in Arkansas; 285 a mound in North Carolina; 286, which is a bright red and the only one painted, is from a mound in Tennessee; 287 is from a mound in Louisiana.

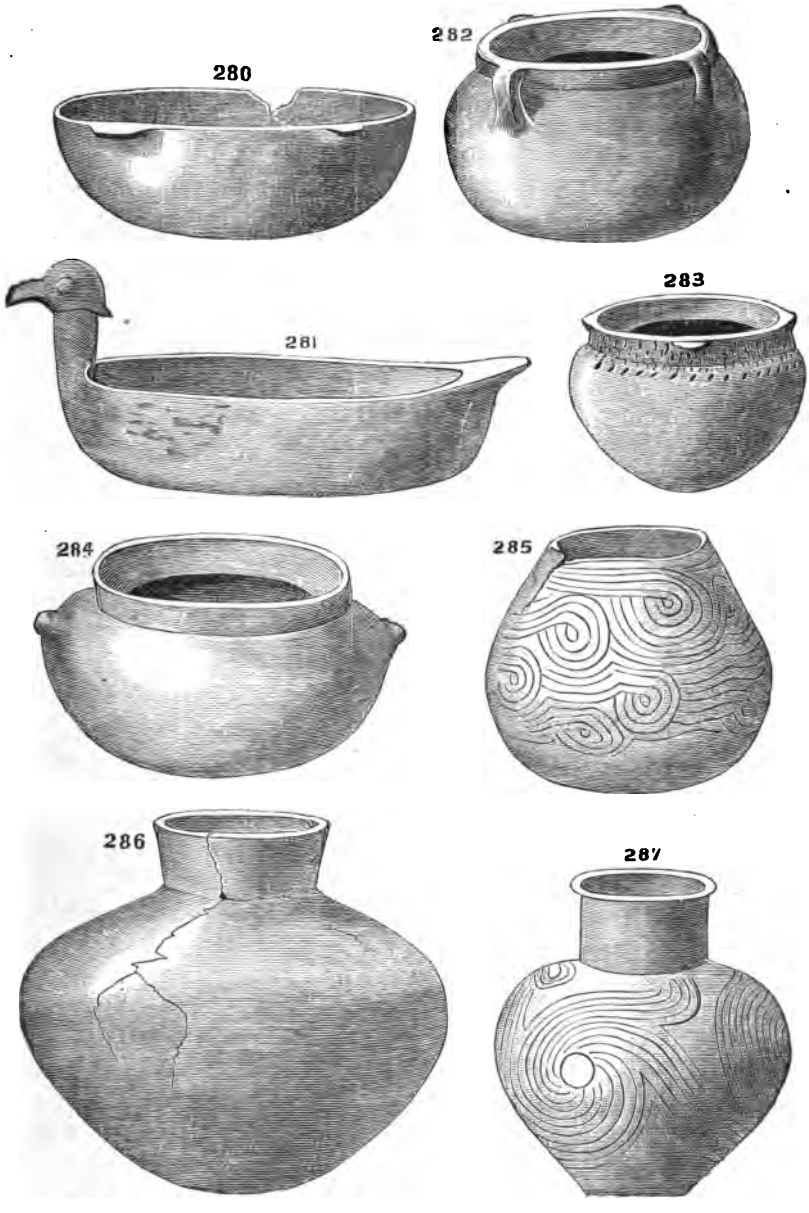

FIG. 43.—Pottery (¼).

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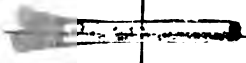

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